U.S. Army

Final
UST Corrective Action Plan-Part B
Building 419
Fort Stewart, Georgia

IMA

August 2014

Submitted to:

Directorate of Public Works
Environmental Division
Fort Stewart, Georgia 31314-4927

Submitted by:

U.S. Army Corps of Engineers
Savannah District
100 West Oglethorpe Avenue
Savannah Georgia 31401-3604

Prepared by:

SpecPro Environmental Services LLC
1006 Floyd Culler Court
Oak Ridge, Tennessee 37830-8022
under
Contract No. W912HN-10-D-0001
Delivery Order No. 0029

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List of Abbreviations and Acronyms

bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CAP	Corrective Action Plan
CFM	cubic feet per minute
DRO	diesel range organics
EFR	enhanced fluid recovery
EPA	U.S. Environmental Protection Agency
EPD	Environmental Protection Division
ft	foot/ feet
GUST	Georgia Underground Storage Tank guidance
IE	invert elevation
ISWQS	In-Stream Water Quality Standards
J	laboratory estimated value
MCL	maximum contaminant level
µg/L	micrograms per liter
MTBE	methyl tertbutyl ether
mg/kg	milligram per kilogram
MW	monitor well
N/A	not applicable
ND	not detected
NRC	no regulatory criteria
PAH	polynuclear aromatic hydrocarbons
PE	Professional Engineer
PPMV	parts per million by volume
RW	recovery well
SB	soil boring
SES	SpecPro Environmental Services LLC
SPH	separate phase hydrocarbons
STEP	Solutions to Environmental Problems, Inc.
TPH	total petroleum hydrocarbons
U	not detected at the detection limit shown
UB	the analyte was found in the associated method blank as well as the sample above the QC level
UST	underground storage tank

CORRECTIVE ACTION PLAN – PART B

Facility Name:	Building 419	Street Address:	Steele Avenue
Facility ID:	N/A	City:	Fort Stewart
County:	Liberty	Zip Code:	31314
Latitude	31° 52'13.80"N	Longitude	81° 36'25.70"W

Submitted by UST Owner/ Operator:		Prepared by Consultant/ Contractor	
Name:	Thomas C. Fry Environmental Division	Name:	Jeffrey C. Williams, PE
Company:	U.S. Army HQ, 3rd, Inf. Div (Mech)	Company	SpecPro Environmental Services LLC
Address:	Directorate of Public Works Building 1137 1550 Veterans Parkway	Address:	1006 Floyd Culler Court
City: Fort Stewart	State: Georgia	City: Oak Ridge	State: Tennessee
Zip Code:	31314-4927	Zip Code	37830
Telephone:	(912) 767-2010	Telephone:	(865) 481-7837

I. PLAN CERTIFICATION

A. UST Owner/Operator Certification

I hereby certify that the information contained in this plan and in all the attachments is true, accurate, and the plan satisfies all criteria and requirements of Rule 391-3-15-09 of the Georgia Rules for Underground Storage Tank Management.

Name: _____

Signature: _____ Date: _____

B. Registered Professional Engineer or Professional Geologist Certification

I hereby certify that I have directed and supervised the field work and preparation of this report, in accordance with State Rules and Regulations. As a registered professional geologist and/or professional engineer, I certify that I am a qualified groundwater professional, as defined by the Georgia State Board of Professional Geologists. All of the information and laboratory data in this plan and in all of the attachments are true, accurate, complete, and in accordance with applicable State Rules and Regulations.

Name: Jeffrey C. Williams, PE

Signature: Jeffrey C Williams

Date: 8/1/14

GEORGIA REGISTERED No. 028348 PROFESSIONAL ENGINEER JEFFREY C. WILLIAMS

Georgia Stamp or Seal

Check all boxes that apply. Attach supporting documentation (i.e., narrative, figures, tables, maps, boring/ well logs, etc.) for all items checked. Supporting documentation should be three-hole punched and prepared in conformity with the guidance document "Underground Storage Tank (UST) Release: Corrective Action Plan – Part B (CAP-B) Content," GUST-7B.

II. SITE INVESTIGATION REPORT

XX **Not applicable**

The extent of contamination and the local and site hydrogeology requirements have been fulfilled under the CAP-Part A; therefore, additional SIR reporting is not necessary. Refer to Section VI for details concerning site history and previous investigations.

____ **Extent of contamination**

____ **Local and site hydrogeology**

III. REMEDIAL ACTION PLAN

A. Corrective action completed or in-progress:

____ Not applicable

XX Other (specify)

High vacuum extraction (combination of dual-phase/ multiphase extraction and surfactant injection/ capture). Refer to Section VI for site history and Section X for proposed high vacuum extraction.

B. Objectives of corrective action:

X No further action

____ Provide risk-based corrective action (reference CAP B App. I):

____ Monitor soil and/or groundwater contamination that exceeds levels in Rule 391-3-15-.09(3).

C. Design and operation of corrective action system:

____ Soil ____ Groundwater **X** Free product ____ Surface water ____ Not applicable

D. Implementation (MUST INCLUDE THE FOLLOWING):

NOTE: If no further action is proposed and none of the following apply, a brief explanation must be provided with the signed Certification of Completion.

- Milestone schedule for proposed site activities.
  Refer to Section XI for milestone schedule discussion.
- Monitoring/sampling and reporting plan for measuring interim progress and project completion.
  Refer to Section XI for proposed monitoring/sampling and reporting plan.
- Plan to decommission equipment/wells and close site.
  Refer to Section XI for the plan to decommission wells and close site.

IV. PUBLIC NOTICE

X Not applicable
The corrective action objectives submitted and approved under the CAP-Part A have not changed.

____ Certified letters to adjacent, potentially affected property owners and local officials

____ Legal notice in newspaper, as approved by EPD

____ Other EPD-approved method (specify) _____

V. CLAIM FOR REIMBURSEMENT (FOR GUST TRUST FUND SITES ONLY)

X Not applicable.
Fort Stewart is a federally owned facility and has funded the investigation using U.S. Department of Defense Environmental Restoration Account funds. Application for Georgia UST Trust Fund reimbursement is not being pursued at this time.

____ Cost proposal:

____ A total of all costs incurred to date (MUST INCLUDE THE FOLLOWING)

- Invoices and proofs-of-payment for all costs incurred to date
- Invoices itemized on the GUST-4D
- All noneligible costs clearly identified as such
- Incurred costs itemized per GUST-92 Form or EPD-provided form/specifications

____ A total of estimated costs to complete corrective action

- Estimated costs itemized per GUST-92 Form or EPD-provided form or specifications

____ Total project costs

____ Proposed schedule for reimbursement

____ Lump sum payment upon completion of corrective action

OR

____ Interim payments with final payment upon completion

OR

____ EPD-established payment schedule

VI. SITE HISTORY AND PREVIOUS INVESTIGATIONS

Building 419 [Army and Air Force Exchange Service (AAFES) Post Exchange] serves Fort Stewart Army Post, and its location is shown on Figure 1 (Appendix I). A January 4, 2008, inquiry to an inventory discrepancy indicated that approximately 4,500 gallons of No. 2 heating fuel oil were missing. A piping leak was found behind Building 419 near Steele Avenue on the west side of the loading dock. Mr. Scott Coburn of the Georgia Environmental Protection Division (EPD) Spill Response Center was notified the day the leak was discovered. Fort Stewart personnel determined that the release came from the water heating boiler fuel oil return line connected to a 4,000-gallon underground storage tank (UST). Fort Stewart initiated the emergency spill response in close coordination with Georgia EPD and contracted with SWS First Response to determine the extent of contamination, to remove contaminated soil to groundwater infiltration, and to remove the UST [Figure 2 (Appendix I)]. SWS First Response completed the UST and soil removal on February 7, 2008 [SpecPro Environmental Services (SES), July 2013].

A. Free Product Removal Efforts 2008

On February 12, 2008, Solutions To Environmental Problems, Inc. installed six recovery wells near the location of the former tank. The next day four wells contained free product. The locations of the recovery wells are shown on Figure 2 (Appendix I). Water level readings and free product thicknesses were obtained on February 13, 2008, and are shown on Table 1 (Appendix II). A vacuum extraction truck from Fort Stewart recovered approximately 1,475 gallons of fuel from the recovery wells between February 2008 and November 2008 as summarized in Table 2 (Appendix II).

B. Preliminary Site Investigation

When additional funding became available in Fiscal Year 2011, SES was contracted to conduct a preliminary site investigation and to recover free product.

SES conducted a site investigation consisting of soil and groundwater sampling to determine the extent of the petroleum contamination. In March 2011, SES installed 20 soil borings to 15 feet below ground surface to delineate free product at the site and to determine the extent of the soil contamination. Two soil samples were collected from each boring with the highest readings indicated from the headspace screening. If no organic vapors were detected from the headspace screening, two soil samples were collected from the 0 feet to 3 feet interval and one at the soil/ groundwater interface. Soil boring locations are on Figure 3 (Appendix I). Soil boring SB-10 was installed near the suspected release source area with

the other borings outwardly from that point. The loading dock and building did not allow for borings to be installed to the south. The soil borings were sampled, described, and classified by a geologist and field screened using a photoionization detector. Soil sampling was conducted using direct push technology to obtain continuous samples from the ground surface or immediately below the asphalt/ gravel to the bottom of the boring. Encore samplers and stainless steel spoons were used to obtain the sample from the appropriate depth, in accordance with "Soil Sampling Procedure" [Environmental Protection Agency (EPA) Region 4, December 2011]. Figure 3a (Appendix I) shows the benzene, toluene, ethylbenzene, and total xylenes (BTEX) results for concentrations greater than the Georgia Underground Storage Tank (GUST) guidance detection limit for the shallow soil samples, and Figure 3b (Appendix I) shows the results for the deeper soil samples. Soil laboratory analyses are listed in Tables 3 and 4 (Appendix II). All samples reporting elevated benzene concentrations were from the area nearest the wells with free product. BTEX in the remaining samples from soil borings to the east, north, and west of the free product wells were all less than the GUST detection limit for the shallow and deep samples. The soil contamination was delineated in areas to the east, north, and west of the free product wells. All soil borings not used for monitor wells were promptly backfilled with bentonite chips and abandoned. *Final Preliminary Assessment Report for Heating Oil Spill Site Investigation at Building 419, Fort Stewart, Georgia* (SES, August 2012) provides additional information.

Six groundwater monitor wells (designated MW-01, MW-02, MW-03, MW-04, MW-05, and MW-06) were installed in spring 2011 using hollow stem augers in accordance with "Design and Installation of Monitoring Wells" (EPA Region 4, February 2008) at the locations shown on Figure 4 (Appendix I). After development, groundwater samples were obtained in accordance with "Groundwater Sampling" (EPA Region 4, November 2007) using the low flow technique with a variable speed peristaltic pump with Teflon tubing. Samples for volatile organic analyses were obtained using the peristaltic pump/straw method. Depths to water and free product thickness were measured in all wells at the site to determine the groundwater flow direction and gradient. Table 5 (Appendix II) lists the water level readings, and Figure 5 (Appendix I) shows the potentiometric surface. The groundwater flow direction is to the north with a gradient of 0.019 feet per foot. On April 11, 2011, free product was measured in wells RW-01, RW-03, RW-04, and RW-05. Groundwater samples were obtained from the six new wells on April 12, and the groundwater samples were analyzed for BTEX and polynuclear aromatic hydrocarbons (PAHs). The BTEX and PAH analyses are listed in Table 6 and Table 7 respectively. BTEX constituents were detected in MW-04 with an ethylbenzene concentration of 19.8 micrograms per liter (µg/L) and xylene concentration of 112 µg/L, both exceeding the GUST detection limit of 5 µg/L. The In-Stream Water Quality Standard (ISWQS) for ethylbenzene is 28,718 µg/L, and xylene does not have an ISWQS for

comparison. It is noted that monitor well MW-04 reported free product just before the June 12, 2011, enhanced fluid recovery (EFR) event. PAHs were not detected above the GUST detection limit of 10 µg/L in any well. Based on the groundwater analytical results, SES determined that the dissolved petroleum contamination is limited to the area containing the free product. The loading dock and Building 419 prevented wells from being installed in areas immediately south (upgradient) of the site. (SES, August 2012). SES recommended completing a Corrective Action Plan (CAP)-Part A for the UST release with installation of three to five soil borings and groundwater monitor wells to delineate contamination and free product. SES recommended a pilot study consisting of surfactant injection and multiphase extraction after the free product is delineated to address the free phase product at the site (SES, August 2012). The Georgia EPD approved both recommendations (Guentert, August 2012).

Three EFR events were performed at the site (June 2011, July 2011, and August 2011) as listed in Table 8 (Appendix II). Before and after each event, water level readings were obtained from each recovery well and are listed in Table 5 (Appendix II). SES subcontractor EcoVac Services used a multiphase extraction system capable of providing up to 20 inches mercury (Hg) vacuum and up to 20 gallons per minute influent flow rate. The EFR system removed 611 pounds of petroleum hydrocarbons vapor. Total liquid removed was 7,667 gallons with 90 gallons of total product removed during 22 hours of operation as shown in Table 8 (Appendix II). All recovered liquid was transported to the EQ Augusta's treatment facility in Augusta, Georgia, for disposal (SES, August 2012).

C. CAP-Part A Site Investigation

In July 2013 and August 2013, SES installed four soil borings to complete the soil delineation at the site. Figure 6 (Appendix I) shows all the boring locations. A surface sample (first soil encountered from the 1 foot to 3 feet interval) was obtained from each boring, and a second sample was obtained from each boring above the water table. The soil samples were analyzed for BTEX, methyl tertbutyl ether, PAHs, and total petroleum hydrocarbons (TPH) diesel range organics (DRO). The analytical results are listed in Table 9 and Table 10 (Appendix II). The analyses did not detect BTEX concentrations above the GUST detection limit, and PAHs were not detected in the subsurface samples. TPH DRO concentrations ranged from not detected to 46 milligrams per kilogram (mg/kg); however, there is no comparison criteria for TPH. Because the deeper soil samples did not have concentrations of BTEX or PAHs above the GUST detection limit, it is concluded that the soil contamination is limited to the area previously identified that contains the free product.

In July 2013 and August 2013, SES installed three additional monitor wells (designated MW-07, MW-08, and MW-09) using hollow stem augers in accordance with "Design and Installation of Monitoring Wells" (EPA Region 4, January 2013) to complete the groundwater delineation at the site. It is noted that groundwater monitor well MW-09 encountered heaving sand during development, destroying the well screen, and that well was overdrilled, backfilled with grout, and abandoned. MW-09A was installed near well MW-09 to replace MW-09. On August 8, 2013, the three groundwater monitor wells were sampled. Depths to water and free product thickness were measured in all wells at the site to determine the groundwater flow direction and gradient. Table 5 (Appendix II) lists the water level readings, and Figure 7 (Appendix I) shows the potientiometric surface. The groundwater flow direction is to the north with a gradient of 0.026 feet per foot. Groundwater samples were obtained from monitor wells MW-07, MW-08, and MW-09A using the low flow technique with a variable speed peristaltic pump with Teflon tubing. Free product was measured in RW-04, RW-05, RW-06, and MW-04. Free product thicknesses are listed in Table 5 (Appendix II). Laboratory analytical results are listed in Table 11 and Table 12 (Appendix II). Sample results show no BTEX and PAH analytes were detected above the GUST detection limits for the three wells. Therefore, it is determined that the groundwater contamination is limited to the area of the free product, and additional groundwater delineation should not be required.

SES proposed a pilot study using EFR with the addition of a surfactant. From December 9, 2013, through February 18, 2014, SES subcontractor EcoVac Services implemented its proprietary SURFAC® technology (U.S. Patent No. 6,158,924) at the Building 419 site to remove separate phase hydrocarbons (SPH). SURFAC® involves surfactant injection and capture coupled with multiphase/dual-phase extraction. James Guentert of the Georgia EPD Solid Waste Management Program approved this EFR pilot study (Guentert, December 2013).

VII. CURRENT INVESTIGATION – EFR PILOT STUDY

The EFR pilot study and surfactant injections consisted of 11 events (No. 4 through No. 14) from December 9, 2013, through February 18, 2014. Depths to groundwater at all site wells were measured prior to each event. The groundwater elevations and free product thicknesses are listed in Table 5 (Appendix II). Figure 8 (Appendix I) shows the potentiometric surface on December 9, 2013, and Figure 9 (Appendix I) shows the free product thicknesses. On December 9, 2013, the groundwater was flowing toward the north at a gradient of 0.011 feet/foot. On February 18, 2014, the groundwater was flowing toward the north at a gradient of 0.018 feet/foot, as shown on Figure 10 (Appendix I), and there was no free product at the site.

A. SURFAC® Pilot Test – Event No. 4 (December 9, 2013)

SPH was present in four site wells (MW-04 at 1.25 feet thick, RW-04 at 2.19 feet thick, RW-05 at 1.56 feet thick, and RW-06 at 3.88 feet thick) prior to conducting this SURFAC® pilot test event. This event was conducted for eight hours at two extraction points, consisting of the initial four hours of extraction at MW-04 and the final four hours at RW-04. Free product was detected in RW-05 (1.56 feet) and RW-06 (3.66 feet) upon completion of the test. A calculated total of 167 pounds of petroleum hydrocarbons (approximately 25 equivalent gallons of diesel fuel/gasoline) was removed during this pilot test. Vapor concentrations ranged from 980 to 100,000 parts per million by volume (PPMV), and vapor flow rates ranged from 29 to 69 cubic feet per minute (CFM) throughout the pilot test event. Approximately 1,019 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this pilot test. The details of event No. 4 are in Appendix III.

B. SURFAC® Pilot Test – Event No. 5 (December 10, 2013)

SPH was detected in three wells (MW-04 at 0.12 feet, RW-05 at 1.13 feet, and RW-06 at 3.86 feet) prior to conducting this SURFAC® pilot test. This pilot test was conducted for eight hours at two extraction points, consisting of the initial four hours of extraction at RW-06 and the final four hours at RW-05. SPH was detected in MW-04 (0.40 feet) and RW-04 (0.02 feet) upon completion of this test. A calculated total of 94 pounds of petroleum hydrocarbons (approximately 14 equivalent gallons of diesel fuel/gasoline) was removed during this pilot test. Vapor concentrations ranged from 3,400 to 90,000 PPMV during this test. Vapor flow rates ranged from 34 to 39 CFM throughout the pilot test. Approximately 909 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this pilot test. The details of event No. 5 are in Appendix III.

C. SURFAC® Pilot Test - Event No. 6 (January 7, 2014)

SPH was detected in four gauged wells (MW-04 at 0.84 feet, RW-04 at 1.09 feet, RW-05 at 0.57 feet, and RW-06 at 0.86 feet) prior to conducting this EFR® event. This event was conducted for eight hours at four extraction points: MW-04, RW-04, RW-05, and RW-06. SPH was not detected in any gauged wells upon completion of this event. A calculated total of 42 pounds of petroleum hydrocarbons (approximately 6.4 equivalent gallons of diesel fuel/gasoline) was removed. Hydrocarbon removal rates ranged from 1.7 to 17 pounds per hour. Vapor concentrations ranged from 1,200 to 12,000 PPMV.

Vapor flow rates remained at 88 CFM. Approximately 2,417 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event. The details of event No. 6 can be found in Appendix III.

D. SURFAC® Pilot Test - Event No. 7 (January 8, 2014)

SPH was detected in four gauged wells (MW-04 at 0.14 feet, RW-04 at 0.01 feet, RW-05 at 0.01 feet, and RW-06 at 0.06 feet) prior to conducting this EFR® event. This event was conducted for eight hours at four extraction points: MW-04, RW-04, RW-05, and RW-06. SPH was not detected in any gauged wells upon completion of this event. A calculated total of 10 pounds of petroleum hydrocarbons (approximately 1.6 equivalent gallons of diesel fuel/gasoline) was removed. Hydrocarbon removal rates ranged from 0.8 to 4.6 pounds per hour with a trend of decreasing removal rates throughout this event. Vapor concentrations ranged from 560 to 3,200 parts PPMV. Vapor flow rates remained at 88 CFM. Approximately 2,253 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event. The details of event No. 7 can be found in Appendix III.

E. SURFAC® Pilot Test - Event No. 8 (February 10, 2014)

SPH was detected in four gauged wells (MW-04 at 0.95 foot, RW-04 at 2.45 feet, RW-05 at 0.74 foot, and RW-06 at 0.20 foot) prior to conducting this SURFAC® event. This event was conducted for approximately 6.25 hours at four extraction points: MW-04, RW-04, RW-05, and RW-06. SPH was not detected in any gauged wells upon completion of this injection event. A calculated total of 66 pounds of petroleum hydrocarbons (approximately 10 equivalent gallons of petroleum hydrocarbons) was removed during this injection event. Hydrocarbon removal rates ranged from 2.4 to 40 pounds per hour with a trend of decreasing removal rates throughout this event. Vapor concentrations ranged from 2,000 to 28,000 parts PPMV. Vapor flow rates ranged from 74 to 88 CFM. Approximately 1,588 gallons of liquid were removed and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event. The details of event No. 8 can be found in Appendix III.

F. SURFAC® Pilot Test – Event No. 9 (February 11, 2014)

No extraction occurred; this event was entirely a SURFAC® injection event.

G. SURFAC® Pilot Test – Event No. 10 (February 12, 2014)

SPH was not detected in any gauged wells prior to or upon completion of this SURFAC® event. This event was conducted for approximately 6.5 hours at two extraction points: RW-04 and RW-05. A calculated total of 8.8 pounds of petroleum hydrocarbons (approximately 1.3 equivalent gallons of petroleum hydrocarbons) was removed. Hydrocarbon removal rates ranged from 0.2 to 1.8 pounds per hour with a trend of increasing removal rates throughout this event. Vapor concentrations ranged from 300 to 2,800 PPMV. Vapor flow rates ranged from 39 to 54 CFM. Approximately 345 gallons of liquid were removed and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this injection event. The details of event No. 10 can be found in Appendix III.

H. SURFAC® Pilot Test – Event No. 11 (February 13, 2014)

SPH was not detected in any of the gauged wells prior to or upon completion of this SURFAC® event. This event was conducted for eight hours at four extraction points: MW-04, RW-04, RW-05, and RW-06. A calculated total of 12 pounds of petroleum hydrocarbons (approximately 1.8 equivalent gallons of petroleum hydrocarbons) was removed. Hydrocarbon removal rates ranged from 0.7 to 2.7 pounds per hour. Vapor concentrations ranged from 700 to 2,600 PPMV during this capture event. Vapor flow rates ranged from 59 to 69 CFM. Approximately 1,407 gallons of liquid were removed and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this capture event. The details of event No. 11 can be found in Appendix III.

I. SURFAC® Pilot Test – Event No. 12 (February 16, 2014)

SPH was detected in two gauged wells (RW-04 at 0.02 feet and RW-05 at 0.02 feet) prior to conducting this SURFAC® event. This event was conducted for seven hours at four extraction points: MW-04, RW-04, RW-05, and RW-06. SPH was not detected in any gauged wells upon completion of this event. A calculated total of 5.9 pounds of petroleum hydrocarbons (approximately 0.9 equivalent gallons of petroleum hydrocarbons) was removed. Hydrocarbon removal rates ranged from 0.6 to 1.2 pounds per hour. Vapor concentrations ranged from 600 to 1,200 PPMV. Vapor flow rates ranged from 49 to 64 CFM. Approximately 1,330 gallons of liquid were removed and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this capture event. The details of event No. 12 can be found in Appendix III.

J. SURFAC® Pilot Test – Event No. 13 (February 17, 2014)

SPH was not detected in any gauged wells prior to or upon completion of this SURFAC® event. This event was conducted for seven hours at four extraction points: MW-04, RW-04, RW-05, and RW-06. A calculated total of 4.6 pounds of petroleum hydrocarbons (approximately 0.7 equivalent gallons of petroleum hydrocarbons) was removed. Hydrocarbon removal rates ranged from 0.4 to 0.9 pounds per hour. Vapor concentrations ranged from 400 to 800 PPMV during this capture event. Vapor flow rates remained at 69 CFM. Approximately 949 gallons of liquid were removed during this event and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event. The details of event No. 13 can be found in Appendix III.

K. SURFAC® Pilot Test – Event No. 14 (February 18, 2014)

SPH was not detected in any gauged wells prior to or upon completion of conducting this SURFAC® event. This event was conducted for eight hours at four extraction points: MW-04, RW-04, RW-05, and RW-06. A calculated total of 3.4 pounds of petroleum hydrocarbons (approximately 0.5 equivalent gallons of petroleum hydrocarbons) was removed. Hydrocarbon removal rates ranged from 0.4 to 0.6 pound per hour during this event. Vapor concentrations ranged from 280 to 560 PPMV. Vapor flow rates ranged from 64 to 78 CFM. Approximately 1,005 gallons of liquid were removed and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event. The details of event No. 14 can be found in Appendix III.

L. EFR Pilot Test Summary

A calculated total of 413.7 pounds of petroleum hydrocarbons (approximately 62.2 equivalent gallons of petroleum hydrocarbons) was recovered during the pilot test. Approximately 2,776 gallons of a surfactant aqueous solution were injected into MW-04, RW-04, RW-05, and RW-06 throughout the SURFAC® process. A total of 13,222 gallons of liquid were recovered and transported to Georgia Petroleum in Valdosta, Georgia, for disposal. Appendix III summarizes the EFR pilot test.

The pilot test determined the surfactant injection locations of the four wells that were used were adequate in removing the free product at the site. The volumes and sequence of surfactant removed the free product. Monitoring the free product at the site will determine the need for additional injection/capture events. It was concluded that the pilot test was successful in removing the free product from the four wells previously containing the free product.

VIII. GROUNDWATER MONITORING EVENT, MAY 7, 2014

On May 7, 2014, SES conducted a groundwater monitoring event at the site that consisted of measuring the water level in each well and determining if free product had returned to the site. The results of the monitoring event are shown in Table 5. Monitor wells RW-04, RW-05, and RW-06 contained free product at thicknesses of 1.42 feet, 0.07 feet, and 1.13 feet respectively. The groundwater flow direction was to the north at a gradient of 0.022 feet/foot as shown on Figure 11, and the free product thicknesses are shown on Figure 12.

IX. SITE RANKING

The Environmental Site Sensitivity Score for the CAP-Part A was 294,878 (October 29, 2013).
The Environmental Site Sensitivity Score for the CAP-Part B is 96,606 (June 3, 2014). The current site ranking is calculated in Appendix IV.

X. CONCLUSIONS

On August 8, 2013, free product was measured in RW-04, RW-05, RW-06, and MW-04 at a thickness of 2.27 feet, 2.55 feet, 4.02 feet, and 1.70 feet respectively. On May 7, 2014, approximately three months after the EFR pilot test, only monitor wells RW-04, RW-05, and RW-06 contained free product at thicknesses of 1.42 feet, 0.07 feet, and 1.13 feet respectively indicating the free product went down after the pilot tests. An additional EFR with the addition of the surfactant is recommended.

XI. RECOMMENDATIONS

Based on the success of the pilot test in reducing the thickness of the free product at the site, additional extraction and surfactant injection are proposed. SES recommends a one-day (eight-hour) EFR extraction to reduce the free product thickness to ± 0.5 feet or less. After the groundwater has reasonably recharged (usually within a week), seven days of eight-hour per day extraction/surfactant injection/capture events should be conducted at MW-04, RW-04, RW-05, RW-06. As with the pilot test, 3,000 gallons of diluted surfactant mixture should be used. The wells should be checked for free product 30 days after the seven-day extraction/surfactant injection/ capture.

If free product has returned after the first extraction/surfactant/capture a second extraction/ surfactant/ capture should be conducted, including a one-day (eight-hour) EFR extraction followed by seven days of eight-hour per day extraction/ surfactant injection/ capture at MW-04, RW-04, RW-05, RW-06. The

wells should be checked for free product 30 days after the second seven-day extraction/surfactant injection/ capture.

If no free product exists (based on the monitoring that will occur 30 days after the first or second extraction/ surfactant injection/ capture), the nine groundwater wells at the site should be monitored for BTEX for four quarterly and two semiannual events to determine the effectiveness of the extraction/ surfactant injection/ capture events.

After it is concluded the free product has been removed from the site and BTEX levels are confirmed below Georgia USTMP guidelines for four quarterly and two semiannual sampling events, the wells should be plugged and abandoned in accordance with state of Georgia regulations Official Code of Georgia (OCGA) 12-5-134(6)(J), which states, "Abandoned engineering boreholes, geologic boreholes, dewatering wells, monitoring wells, and seismic shot holes shall be filled, sealed and plugged under the direction of a registered professional geologist or registered professional engineer." In addition the guidance found in Circular 13 *Grouting and Plugging of Domestic Water Wells in the State of Georgia* (Georgia Department of Natural Resources, 1988) should be followed.

SES expects Georgia EPD's approval process for this document to take approximately 30 days. Fort Stewart expects to be able to fund the injection/ extraction event soon. The monitoring will take place after the free product has been removed.

XII. REFERENCES

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Appendix I

Report Figures

Appendix II

Report Tables

Table 1 Free Product Thickness by STEP, February 13, 2008
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Well Number	Total Depth of Well (ft.)	Depth to Water (ft.)	Depth to Free Product (ft.)	Product Thickness (ft.)
RW-01	10.0	7.71	6.71	1.0
RW-02	10.0	8.01	N/A	N/A
RW-03	10.0	8.03	N/A	N/A
RW-04	10.0	7.91	5.91	2.0
RW-05	10.0	7.83	5.83	2.0
RW-06	8.0	4.31	1.31	3.0

Prepared by Jeffrey C. Williams, PE — Date: June 5, 2014
Reviewed by Doug Hawn — Date: June 6, 2014
ft. = foot/ feet — N/A = not applicable
RW = recovery well

Table 2 Fuel Recovery by Fort Stewart
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Date	Fuel Pumped (gallons)	Groundwater Pumped (gallons)
2/8/2008	250	0
2/15/2008	130	0
2/28/2008	100	350
3/3/2008	100	125
3/12/2008	100	100
3/14/2008	100	75
3/17/2008	100	25
4/3/2008	180	20
4/18/2008	200	60
4/25/2008	75	50
5/13/2008	60	80
5/19/2008	75	55
7/29/2008	5	170
10/23/2008	Unknown	600
10/30/2008	Unknown	400
11/6/2008	Unknown	175
Total pumped	1,475	2,285

Table 3 Preliminary Assessment and Site Investigation Soil Analytical Results, March 2011
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Sample Location	Depth (ft. bgs)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH-DRO (mg/kg)
SB-01-01	1-3	03/29/11	0.000490U	0.000897U	0.000782U	0.000730U	ND	7.28 U
SB-01-02	8-9	03/29/11	0.000467U	0.000855U	0.000746U	0.000696U	ND	7.68 U
SB-02-01	1-3	03/29/11	0.000514U	0.000940U	0.000820U	0.000765U	ND	**19.3**
SB-02-02	8-9	03/29/11	0.000576U	0.00105U	0.000920U	0.000859U	ND	8.91 U
SB-03-01	1-3	03/29/11	0.000461U	0.000844U	0.000736U	0.000687U	ND	7.47 U
SB-03-019	1-3	03/29/11	0.000537U	0.000982U	0.000856U	0.000799U	ND	7.68 U
SB-03-02	6-7	03/29/11	0.000492U	0.000900U	0.000785U	0.000732U	ND	7.67 U
SB-04-01	1-3	03/29/11	0.000481UJ	0.000881UJ	0.000768UJ	0.000717UJ	ND	**39.5**
SB-04-02	6-7	03/29/11	0.000558U	0.00102U	0.000891U	0.000831U	ND	7.61 U
SB-05-01	1-3	03/29/11	0.000485U	0.000887U	0.000774U	0.000722U	ND	7.31 U
SB-05-02	6-6.5	03/29/11	0.000569U	0.00104U	0.000907U	0.000847U	ND	**9.33**
SB-06-01	1-3	03/29/11	0.000534U	0.000976U	0.000851U	0.000795U	ND	7.22 U
SB-06-02	7	03/29/11	0.000499U	0.000914U	0.000797U	0.000744U	ND	7.84 U
SB-07-01	1-3	03/29/11	0.000689UJ	0.00126 UJ	0.00110 UJ	0.00103 UJ	ND	**11.2**
SB-07-02	7	03/29/11	0.000469U	0.000858U	0.000749U	0.000699U	ND	7.79 U
SB-08-01	1-3	03/29/11	0.000479U	0.000876U	0.000764U	0.000713U	ND	7.59 U
SB-08-02	7	03/29/11	0.000473U	0.000865U	0.000755U	0.000704U	ND	7.62 U
SB-09-01	6-7	03/29/11	0.000497U	0.00266 J	0.000793U	0.000740U	0.00266J	**10.3**
SB-09-02	10-11	03/29/11	0.000543U	0.000993U	0.000866U	0.000808U	ND	8.14 U
SB-10-01	6-7	03/29/11	**0.504 J**	**0.624 U**	**3.780**	**23.4**	28.308J	**22,100**
SB-10-02	8-9	03/29/11	0.000522U	0.000956U	0.000834U	0.000778U	ND	**16.2**
SB-11-01	5	03/29/11	**0.0216 U**	**0.0395 U**	**0.147 J**	**0.758**	0.967UJ	**918 J**
SB-11-02	9.5	03/29/11	**0.00661**	0.000937 U	0.00299 J	**0.0173**	0.03351UJ	7.75 U
SB-12-01	5	03/29/11	0.000534U	0.000977U	0.000852U	0.000795U	ND	**29.3**
SB-12-02	8	03/29/11	0.000468U	0.000857U	0.000747U	0.000698U	ND	**39.6**
SB-13-01	1-3	03/30/11	0.000526 U	0.000963 U	0.000840 U	0.000784 U	ND	**53**
SB-13-02	8.5	03/30/11	**0.183 J**	**0.048 U**	**2.190**	**10.5**	12.921 UJ	**13,900**
SB-14-01	3	03/30/11	0.00474U	0.00867U	0.00112J	0.000706U	ND	**39**
SB-14-02	7	03/30/11	0.00163 UJ	0.00298 UJ	0.00260 UJ	0.00243 UJ	ND	**47.9**
SB-15-01	3-4	03/30/11	**0.0241 U**	**0.0441U**	**0.0384U**	**0.0359 U**	0.1425U	**13.7**
SB-15-02	7	03/30/11	0.000502U	0.000918U	0.000801U	0.000747U	ND	**13.5**
SB-16-01	7-7.5	03/30/11	**0.143 J**	**0.00955 J**	**2.290**	**4.7**	7.14255J	**8070**
SB-16-02	8-8.5	03/30/11	**0.0589 J**	**0.0867 U**	**0.385 J**	**1.82**	2.3506UJ	**8310**

Table 3 Preliminary Assessment and Site Investigation Soil Analytical Results, March 2011
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Sample Location	Depth (ft. bgs)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH-DRO (mg/kg)
SB-17-01	8	03/30/11	0.00183 J	**0.00945 UJ**	**0.0289 J**	**0.0943 J**	0.13448UJ	**3590**
SB-17-02	10	03/30/11	**0.100 U**	**0.183 U**	**0.160 U**	**0.502 J**	0.945UJ	**163**
SB-18-01	6-7	03/30/11	**0.0843 J**	**0.152 U**	**0.133 U**	**0.563 J**	0.9323UJ	**3890**
SB-18-02	10	03/30/11	**0.173 J**	**0.125 U**	**0.276 J**	**2.59**	3.164 UJ	**296**
SB-19-01	4	03/30/11	0.000458U	0.000838U	0.000731U	0.000682U	ND	7.16 U
SB-19-02	8	03/30/11	0.000619UJ	0.00113UJ	0.000987UJ	0.000921UJ	ND	**20.2**
SB-20-01	4	03/30/11	0.000601U	0.00110U	0.000960U	0.000896U	ND	**16.6**
SB-20-019	4	03/30/11	0.000649UJ	0.00119UJ	0.00104UJ	0.000966UJ	ND	**17.3**
SB-20-02	8.5	03/30/11	0.000653U	0.00119U	0.00104U	0.000972U	ND	8.43 U
Applicable Standards – Table A			0.008	6.00	10.00	700.00	N/A	N/A
GUST Detection Limit			0.005	0.005	0.005	0.005	N/A	10

Prepared by Jeffrey C. Williams, PE Date: June 5, 2014
Reviewed by Doug Hawn Date: June 6, 2014

NOTES:
SB-03-019 is a duplicate sample of SB-03-01 and SB-20-019 is a duplicate sample of SB-20-01.
Applicable standard is GUST-CAP A Guidelines, Table A for average or higher susceptibility area where public water supplies exist within 2.0 miles or nonpublic water supplies exist within 0.5 miles and the site is more than 500 feet to a withdrawal point.
Bold value denotes concentration greater than GUST detection limit. Shaded value denotes concentration greater than Table A threshold value.
Shaded value denotes concentration exceeded Applicable Table A Standard.

bgs = below ground surface
DRO = diesel range organics
J = laboratory estimated value
ND = not detected
TPH = total petroleum hydrocarbons
BTEX = benzene, toluene, ethylbenzene, xylenes
ft. = foot or feet
mg/ kg = milligrams per kilogram
SB = soil boring
U = concentration less than the laboratory detection limit shown

Table 4 Preliminary Assessment and Site Investigation Soil Analytical Results for Polynuclear Aromatic Hydrocarbons, March 2011
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave., Liberty County, Fort Stewart, Georgia 31314

Sample Location	Depth (ft.)	Date Sampled	Acenaphthene (mg/kg)	Acenaphthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(g,h,i)perylene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenz(a,h)anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indene(1,2,3-cd)pyrene (mg/kg)	1-Methylnaphthalene (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
SB-01-01	1-3	03/29/11	0.0285 U	0.0219 U	0.0295 U	0.0394 U	0.0252 U	0.0350 U	0.0766 U	0.0427 U	0.0339 U	0.0657 U	0.0591 U	0.0285 U	0.0503U	0.109 U	0.0383 U	0.0350 U	0.0252 U	0.0438 UJ
SB-01-02	8-9	03/29/11	0.0300 U	0.0231 U	0.0312 U	0.0415 U	0.0265 U	0.0369 U	0.0808 U	0.0450 U	0.0358 U	0.0692 U	0.0623 U	0.0300 U	0.0531 U	0.115 U	0.0404 U	0.0369 U	0.0265 U	0.0462 UJ
SB-02-01	1-3	03/29/11	0.0272 U	0.0209 U	0.0282 U	0.0376 U	0.0240 U	0.0334 U	0.0731 U	0.0407 U	0.0324 U	0.0627 U	0.0564 U	0.0272 U	0.0480 U	0.104 U	0.0366 U	0.0334 U	0.0240 U	0.0418 J
SB-02-02	8-9	03/29/11	0.0348 U	0.0268 U	0.0362 U	0.0482 U	0.0308 U	0.0428 U	0.0937 U	0.0522 U	0.0415 U	0.0803 U	0.0723 U	0.0348 U	0.0616 U	0.134 U	0.0469 U	0.0428 U	0.0308 U	0.0536 UJ
SB-03-01	1-3	03/29/11	0.0300 U	0.0230 U	0.0311 U	0.0415 U	0.0265 U	0.0369 U	0.0807 U	0.0449 U	0.0357 U	0.0691 U	0.0622 U	0.0300 U	0.0530 U	0.115 U	0.0403 U	0.0369 U	0.0265 U	0.0461 UJ
SB-03-019	1-3	03/29/11	0.0298 U	0.0229 U	0.0309 U	0.0413 U	0.0264 U	0.0367 U	0.0802 U	0.0447 U	0.0355 U	0.0688 U	0.0619 U	0.0298 U	0.0527 U	0.015 U	0.0401 U	0.0367 U	0.0264 U	0.0458 UJ
SB-03-02	6-7	03/29/11	0.0296 U	0.0228 U	0.0307 U	0.0410 U	0.0262 U	0.0364 U	0.0797 U	0.0444 U	0.0353 U	0.0683 U	0.0615 U	0.0296 U	0.0523 U	0.014 U	0.0398 U	0.0364 U	0.0262 U	0.0455 UJ
SB-04-01	1-3	03/29/11	0.0293 U	0.0225 U	0.0304 U	0.0406 U	0.0259 U	0.0361 U	0.0789 U	0.0440 U	0.0349 U	0.0676 U	0.0609 U	0.0293 U	0.0519 U	0.113 U	0.0395 U	0.0361 U	0.0259 U	0.0451 UJ
SB-04-02	6-7	03/29/11	0.0303 U	0.0233 U	0.0315 U	0.0419 U	0.0268 U	0.0373 U	0.0816 U	0.0454 U	0.0361 U	0.0699 U	0.0629 U	0.0303 U	0.0536 U	0.117 U	0.0408 U	0.0373 U	0.0268 U	0.0466 UJ
SB-05-01	1-3	03/29/11	0.0280 U	0.0215 U	0.0291 U	0.0387 U	0.118 J	0.140 J	0.106 J	0.0544 J	0.0921 J	0.0646 U	0.0581 U	0.0280 U	0.0495 U	0.108 U	0.0377 U	0.0344 U	0.0248 U	0.0955 J
SB-05-02	6-6.5	03/29/11	0.0297 U	0.0229 U	0.0309 U	0.0412 U	0.0263 U	0.0366 U	0.0801 U	0.0446 U	0.0355 U	0.0686 U	0.0618 U	0.0297 U	0.0526 U	0.114 U	0.0400 U	0.0366 U	0.0263 U	0.0458 U
SB-06-01	1-3	03/29/11	0.0280 U	0.0215 U	0.0291 U	0.0388 U	0.0248 U	0.0345 U	0.0754 U	0.0420 U	0.0334 U	0.0646 U	0.0582 U	0.0280 U	0.0496 U	0.108 U	0.0377 U	0.0345 U	0.0248 U	0.0431 UJ
SB-06-02	7	03/29/11	0.0312 U	0.0240 U	0.0324 U	0.0432 U	0.0276 U	0.0384 U	0.0840 U	0.0468 U	0.0372 U	0.0720 U	0.0648 U	0.0312 U	0.0552 U	0.120 U	0.0420 U	0.0384 U	0.0276 U	0.0480 UJ
SB-07-01	1-3	03/29/11	0.0321 U	0.0247 U	0.0333 U	0.0444 U	0.0284 U	0.0395 U	0.0864 U	0.0481 U	0.0383 U	0.0741 U	0.0666 U	0.0321 U	0.0568 U	0.123 U	0.0432 U	0.0395	0.0284 U	0.0494 UJ
SB-07-02	7	03/29/11	0.0294 U	0.0226 U	0.0306 U	0.0408 U	0.0260 U	0.0362 U	0.0793 U	0.0442 U	0.0351 U	0.0679 U	0.0611 U	0.0294 U	0.0521 U	0.113 U	0.0396 U	0.0362 U	0.0260 U	0.0453 U
SB-08-01	1-3	03/29/11	0.0297 U	0.0228 U	0.0308 U	0.0411 U	0.0262 U	0.0365 U	0.0798 U	0.0445 U	0.0354 U	0.0684 U	0.0616 U	0.0297 U	0.0525 U	0.114 U	0.0399 U	0.0365 U	0.0262 U	0.0456 UJ
SB-08-02	7	03/29/11	0.0300 U	0.0230 U	0.0311 U	0.0415 U	0.0265 U	0.0369 U	0.0807 U	0.0449 U	0.0357 U	0.0691 U	0.0622 U	0.0300 U	0.0530 U	0.115 U	0.0403 U	0.0369 U	0.0265 U	0.0461 UJ
SB-09-01	6-7	03/29/11	0.0281 U	0.0216 U	0.0292 U	0.107 J	0.102 J	0.207 J	0.0756 U	0.0801 J	0.128 J	0.0648 U	0.113 J	0.0281 U	0.0497 U	0.108 U	0.0378 U	0.0346 U	0.0249 U	0.297 J
SB-09-02	10-11	03/29/11	0.0308 U	0.0237 U	0.0320 U	0.0426 U	0.0272 U	0.0379 U	0.0829 U	0.0462 U	0.0367 U	0.0711 U	0.0640 U	0.0308 U	0.0545U	0.118 U	0.0415 U	0.0379 U	0.0272 U	0.0474 UJ
SB-10-01	6-7	03/29/11	**25.900 U**	**20.000 U**	**26.900 U**	**35.900 U**	**23.000 U**	**31.900 U**	**69.900 U**	**38.900 U**	**30.900 U**	**59.900 U**	**53.900 U**	**25.900 U**	**45.900 U**	**99.800 U**	**34.900 U**	**31.900 U**	**23.000 U**	**39.900 U**
SB-10-02	8-9	03/29/11	0.0317 U	0.0244 U	0.0329 U	0.0439 U	0.0280 U	0.0390 U	0.0853 U	0.0475 U	0.0378 U	0.0731 U	0.0658 U	0.0317 U	0.0561 U	0.122 U	0.0427 U	0.0390 U	0.0280 U	0.0488 U
SB-11-01	5	03/29/11	0.0277 U	0.0213 U	0.0287 U	0.107 J	0.0711 J	0.133 J	0.0745 U	0.0495 J	0.104 J	0.0639 U	0.108 J	0.0277 U	0.0490 U	0.210 J	0.304 J	0.0716 J	0.0245 U	0.314 J
SB-11-02	9.5	03/29/11	0.0309 U	0.0237 U	0.0320 U	0.0427 U	0.0273 U	0.0380 U	0.0831 U	0.0463 U	0.0368 U	0.0712 U	0.0641 U	0.0309 U	0.0546 U	0.119 U	0.0415 U	0.0380 U	0.0273 U	0.0475 U
SB-12-01	5	03/29/11	0.0320 U	0.0641 J	0.0333 U	0.175 J	0.216 J	0.333 J	0.0863 U	0.161 J	0.245 J	0.0739 U	0.207 J	0.0320 U	0.0567 U	0.123 U	0.0431 U	0.0394 U	0.0779 J	0.510
SB-12-02	8	03/29/11	0.0280 U	0.0665 J	0.0291 U	0.208 J	0.269 J	0.427	0.161 J	0.120 J	0.289 J	0.0647 U	0.180 J	0.0280 U	0.122 J	0.108 U	0.0503 J	0.0358 J	0.0617 J	0.517
SB-13-01	1-3	03/30/11	0.0273 U	0.210 J	0.0568 J	**0.918**	**1.010**	**1.590 J**	0.490	0.567	**1.020**	0.127 J	**0.981**	0.0273 U	0.359	0.105 U	0.0490 J	0.0469 J	0.128 J	**2.690**
SB-13-02	8.5	03/30/11	0.154 U	0.118 U	0.160 U	0.213 U	0.136 UJ	0.189 UJ	0.414 UJ	0.231 UJ	0.183 U	0.355 UJ	0.319 U	0.154 U	0.272 UJ	**5.460 J**	**8.400 J**	**2.690 J**	**1.640 J**	**0.838 J**
SB-14-01	3	03/30/11	0.0281 U	0.560	0.139 J	**2.890**	**3.100 J**	**3.560 J**	**1.730 J**	**1.640 J**	**2.880**	0.495 J	**1.590**	0.113 J	**1.430 J**	0.108 U	0.149 J	0.175 J	0.271 J	**5.850**
SB-14-02	7	03/30/11	0.0674 U	0.0518 U	0.0700 U	0.0933 U	0.0596UJ	0.0829UJ	0.181 UJ	0.101 UJ	0.0803 U	0.155 UJ	0.140 U	0.0674 U	0.119 UJ	0.259 U	0.0907 U	0.0829 U	0.0596 U	0.197 J
SB-15-01	3-4	03/30/11	0.0297 U	0.0229 U	0.0309 U	0.0412 U	0.0263 U	0.0366 U	0.0800 U	0.0446 U	0.0354 U	0.0686 U	0.0617 U	0.0297 U	0.0526 U	0.114 U	0.0400 U	0.0366 U	0.0263 U	0.0457 U
SB-15-02	7	03/30/11	0.0312 U	0.0472 J	0.0325 U	0.332 J	0.223 J	0.337 J	0.118 J	0.143 J	0.336 J	0.0721 U	0.397 J	0.0312 U	0.0553 U	0.120 U	0.0421 U	0.0385 U	0.139 J	0.640
SB-16-01	7-7.5	03/30/11	0.149 U	0.115 U	0.155 U	0.207 U	0.132 UJ	0.184 UJ	0.402 UJ	0.224 UJ	0.178 U	0.344 UJ	0.310 U	**1.620 J**	0.264 UJ	**9.880 J**	**15.500 J**	**4.910 J**	**4.120 J**	**1.020 J**
SB-16-02	8-8.5	03/30/11	0.169 U	0.130 U	0.175 U	0.234 U	0.149 U	0.208 U	0.455 U	0.253 U	0.201 U	0.390 U	0.351 U	**1.650 J**	0.299 U	**9.240 J**	**14.600 J**	**4.160 J**	**3.880 J**	**0.877 J**

Table 4 Preliminary Assessment and Site Investigation Soil Analytical Results for Polynuclear Aromatic Hydrocarbons, March 2011
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave., Liberty County, Fort Stewart, Georgia 31314 (Continued)

Sample Location	Depth (ft.)	Date Sampled	Acenaphthene (mg/kg)	Acenaphthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(g,h,i)perylene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenz(a,h)anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indene(1,2,3-cd)pyrene (mg/kg)	1-Methylnaphthalene (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
SB-17-01	8	03/30/11	0.160 U	0.123 U	0.166 U	0.221 U	0.141 UJ	0.196 UJ	0.430 UJ	0.239 UJ	0.190 U	0.368 UJ	0.331 U	0.759 J	0.282 UJ	**2.130**	**3.030**	**0.928 J**	**0.876 J**	**0.874 J**
SB-17-02	10	03/30/11	0.0481 U	0.0370 U	0.0499U	0.0665 U	0.0425 U	0.0592 U	0.129 U	0.0721 U	0.0573 U	0.111 U	0.0998 U	0.169 J	0.0850 U	**1.430**	**2.420**	**1.030**	0.231 J	0.0739 U
SB-18-01	6-7	03/30/11	0.210 U	0.161 U	0.218 U	0.290 U	0.185 U	0.258 U	0.565 U	0.315 U	0.250 U	0.484 U	0.435 U	0.210 U	0.371 U	**2.680**	**3.970**	**2.110 J**	**0.738 J**	0.484 J
SB-18-02	10	03/30/11	0.0318 U	0.0245 U	0.0331 U	0.0441 U	0.0282 U	0.0392 U	0.0857 U	0.0477 U	0.0379 U	0.0735 U	0.0661 U	0.0801 J	0.0563 U	0.406	0.655	0.254 J	0.155 J	0.0490 U
SB-19-01	4	03/30/11	0.0278 U	0.0214 U	0.0289 U	0.0385 U	0.0246 U	0.0342 U	0.0748 U	0.0417 U	0.0331 U	0.0642 U	0.0577 U	0.0278 U	0.0492 U	0.107 U	0.0374 U	0.0342 U	0.0246 U	0.0428 U
SB-19-02	8	03/30/11	0.0298 U	0.0229 U	0.0310 U	0.0413 U	0.0264 U	0.0367 U	0.0803 U	0.0447 U	0.0355 U	0.0688 U	0.0619 U	0.0298 U	0.0527 U	0.115 U	0.0401 U	0.0367 U	0.0264 U	0.0530 J
SB-20-01	4	03/30/11	0.0329 U	0.0253 U	0.0341 U	0.0455 U	0.0291 U	0.0404 U	0.0885 U	0.0493 U	0.0392 U	0.0758 U	0.0682 U	0.0329 U	0.0581 U	0.126 U	0.0442 U	0.0404 U	0.0291 U	0.0505 U
SB-20-019	4	03/30/11	0.0356 U	0.0274 U	0.0369 U	0.0493 U	0.0315 U	0.0438 U	0.0958 U	0.0534 U	0.0424 U	0.0821 U	0.0739 U	0.0356 U	0.0629 U	0.137 U	0.0479 U	0.115 J	0.0749 J	0.0547 U
SB-20-02	8.5	03/30/11	0.0323 U	0.0248 U	0.0335 U	0.0447 U	0.0286 U	0.0397 U	0.0869 U	0.0484 U	0.0385 U	0.0745 U	0.0671 U	0.0323 U	0.0571 U	0.124 U	0.0435 U	0.0397 U	0.0286 U	0.0497 U
Applicable Standards –Table A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GUST Detection Limit			0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660

Prepared by Jeffrey C. Williams, PE Date: June 5, 2014
Reviewed by Doug Hawn Date: June 6, 2014

NOTES:
* SB-03-019 is a duplicate sample of SB-03-01 and SB-20-019 is a duplicate sample of SB-20-01.
Applicable standard is GUST-CAP A Guidelines, Table A for average or higher susceptibility area where public water supplies exist within 2.0 miles or nonpublic water supplies exist within 0.5 miles and is more than 500 feet to a withdrawal point.
Bold value denotes concentration exceeded the GUST detection limit
ft. = foot or feet
mg/ kg = milligrams per kilogram
SB = soil boring
J = laboratory-estimated value
N/A = not applicable
U = concentration not detected equal to or greater than lab detection limit

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
RW-01	2/13/08	79.43	79.25	5.2-15.2	6.71	7.71	1.00	70.72
RW-02	2/13/08	79.55	79.22	5.1-15.1	N/A	8.01	0	71.21
RW-03	2/13/08	79.23	79.09	5.12-15.12	N/A	8.03	0	71.06
RW-04	2/13/08	79.35	78.98	5.81-15.81	5.91	7.91	2.00	69.43
RW-05	2/13/08	79.54	79.19	5.12-15.12	5.83	7.83	2.00	69.72
RW-06	2/13/08	77.69	77.59	5-10	1.31	4.31	3.00	70.82
Groundwater Monitoring April 2011, Preliminary Assessment and Site Investigation								
RW-01	4/11/11	79.43	79.25	5.2-15.2	7.95	7.96	0.01	71.30
RW-02	4/11/11	79.55	79.22	5.1-15.1	N/A	8.25	0	70.97
RW-03	4/11/11	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	4/11/11	79.35	78.98	5.81-15.81	7.24	11.18	3.94	71.03
RW-05	4/11/11	79.54	79.19	5.12-15.12	7.41	11.06	3.65	71.12
RW-06	4/11/11	77.69	77.59	5-10	5.24	6.13	0.89	72.19
MW-01	4/11/11	76.57	76.29	4-14	N/A	6.81	0	69.48
MW-02	4/11/11	79.71	79.38	4-14	N/A	7.28	0	72.10
MW-03	4/11/11	80.22	79.94	4-14	N/A	6.65	0	73.29
MW-04	4/11/11	77.12	76.78	4-14	N/A	3.95	0	72.83
MW-05	4/11/11	79.30	78.92	4-14	N/A	7.74	0	71.18
MW-06	4/11/11	79.28	78.92	4-14	N/A	8.11	0	70.81
Enhanced Fluid Recovery Event 1, June 2011 – Before Recovery								
RW-01	6/12/11	79.43	79.25	5.2-15.2	8.54	8.79	0.25	70.67
RW-02	6/12/11	79.55	79.22	5.1-15.1	N/A	8.03	0	71.19
RW-03	6/12/11	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	6/12/11	79.35	78.98	5.81-15.81	7.60	12.10	4.50	70.57
RW-05	6/12/11	79.54	79.19	5.12-15.12	7.81	11.60	3.79	70.70
RW-06	6/12/11	77.69	77.59	5-10	5.79	6.81	1.02	71.62
MW-01	6/12/11	76.57	76.29	4-14	N/A	7.64	0	68.65
MW-02	6/12/11	79.71	79.38	4-14	N/A	8.01	0	71.37
MW-03	6/12/11	80.22	79.94	4-14	N/A	7.66	0	72.28
MW-04	6/12/11	77.12	76.78	4-14	4.51	4.93	0.42	72.19
MW-05	6/12/11	79.30	78.92	4-14	N/A	8.60	0	70.32
MW-06	6/12/11	79.28	78.92	4-14	N/A	8.49	0	70.43
Enhanced Fluid Recovery Event 1, June 2011 – After Recovery								
RW-01	6/12/11	79.43	79.25	5.2-15.2	N/A	10.09	0	69.16
RW-02	6/12/11	79.55	79.22	5.1-15.1	N/A	9.62	0	69.60
RW-03	6/12/11	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	6/12/11	79.35	78.98	5.81-15.81	N/A	9.89	0	69.09

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
RW-05	6/12/11	79.54	79.19	5.12-15.12	N/A	10.36	0	68.83
RW-06	6/12/11	77.69	77.59	5-10	N/A	8.09	0	69.50
MW-01	6/12/11	76.57	76.29	4-14	N/A	5.25	0	71.04
MW-02	6/12/11	79.71	79.38	4-14	N/A	8.19	0	71.19
MW-03	6/12/11	80.22	79.94	4-14	N/A	7.74	0	72.20
MW-04	6/12/11	77.12	76.78	4-14	N/A	7.89	0	68.89
MW-05	6/12/11	79.30	78.92	4-14	N/A	8.73	0	70.19
MW-06	6/12/11	79.28	78.92	4-14	N/A	8.84	0	70.08
Enhanced Fluid Recovery Event 2, July 2011 – Before Recovery								
RW-01	7/17/11	79.43	79.25	5.2-15.2	8.41	8.46	0.05	70.83
RW-02	7/17/11	79.55	79.22	5.1-15.1	N/A	8.67	0	70.55
RW-03	7/17/11	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	7/17/11	79.35	78.98	5.81-15.81	7.79	10.05	2.26	70.78
RW-05	7/17/11	79.54	79.19	5.12-15.12	7.86	10.45	2.59	70.86
RW-06	7/17/11	77.69	77.59	5-10	5.80	6.27	0.47	71.71
MW-01	7/17/11	76.57	76.29	4-14	N/A	7.31	0	68.98
MW-02	7/17/11	79.71	79.38	4-14	N/A	7.79	0	71.59
MW-03	7/17/11	80.22	79.94	4-14	N/A	7.49	0	72.45
MW-04	7/17/11	77.12	76.78	4-14	4.42	4.88	0.46	72.28
MW-05	7/17/11	79.30	78.92	4-14	N/A	8.05	0	70.87
MW-06	7/17/11	79.28	78.92	4-14	N/A	8.31	0	70.61
Enhanced Fluid Recovery Event 2, July 2011 – After Recovery								
RW-01	7/17/11	79.43	79.25	5.2-15.2	N/A	11.51	0	67.74
RW-02	7/17/11	79.55	79.22	5.1-15.1	N/A	9.29	0	69.93
RW-03	7/17/11	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	7/17/11	79.35	78.98	5.81-15.81	N/A	11.63	0	67.35
RW-05	7/17/11	79.54	79.19	5.12-15.12	N/A	10.56	0	68.63
RW-06	7/17/11	77.69	77.59	5-10	N/A	8.26	0	69.33
MW-01	7/17/11	76.57	76.29	4-14	N/A	7.41	0	68.88
MW-02	7/17/11	79.71	79.38	4-14	N/A	8.03	0	71.35
MW-03	7/17/11	80.22	79.94	4-14	N/A	7.59	0	72.35
MW-04	7/17/11	77.12	76.78	4-14	N/A	6.61	0	70.17
MW-05	7/17/11	79.30	78.92	4-14	N/A	8.65	0	70.27
MW-06	7/17/11	79.28	78.92	4-14	N/A	8.77	0	70.15
Enhanced Fluid Recovery Event 3, August 2011 – Before Recovery								
RW-01	8/3/11	79.43	79.25	5.2-15.2	N/A	8.05	0	71.20
RW-02	8/3/11	79.55	79.22	5.1-15.1	N/A	8.70	0	70.52

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
RW-03	8/3/11	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	8/3/11	79.35	78.98	5.81-15.81	7.99	9.39	1.40	70.74
RW-05	8/3/11	79.54	79.19	5.12-15.12	8.04	9.09	1.05	70.96
RW-06	8/3/11	77.69	77.59	5-10	5.96	6.43	0.47	71.55
MW-01	8/3/11	76.57	76.29	4-14	N/A	7.26	0	69.03
MW-02	8/3/11	79.71	79.38	4-14	N/A	7.62	0	71.76
MW-03	8/3/11	80.22	79.94	4-14	N/A	8.86	0	71.08
MW-04	8/3/11	77.12	76.78	4-14	4.59	4.94	0.35	72.13
MW-05	8/3/11	79.30	78.92	4-14	N/A	8.06	0	70.86
MW-06	8/3/11	79.28	78.92	4-14	N/A	8.35	0	70.57
Enhanced Fluid Recovery Event 3, August 2011 – After Recovery								
RW-01	8/3/11	79.43	79.25	5.2-15.2	N/A	9.64	0	69.61
RW-02	8/3/11	79.55	79.22	5.1-15.1	N/A	9.39	0	69.83
RW-03	8/3/11	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	8/3/11	79.35	78.98	5.81-15.81	N/A	11.56	0	67.42
RW-05	8/3/11	79.54	79.19	5.12-15.12	N/A	10.98	0	68.21
RW-06	8/3/11	77.69	77.59	5-10	N/A	8.99	0	68.60
MW-01	8/3/11	76.57	76.29	4-14	N/A	7.54	0	68.75
MW-02	8/3/11	79.71	79.38	4-14	N/A	7.76	0	71.62
MW-03	8/3/11	80.22	79.94	4-14	N/A	8.88	0	71.06
MW-04	8/3/11	77.12	76.78	4-14	N/A	7.47	0	69.31
MW-05	8/3/11	79.30	78.92	4-14	N/A	8.98	0	69.94
MW-06	8/3/11	79.28	78.92	4-14	N/A	8.87	0	70.05
Groundwater Monitoring August 2013								
RW-01	8/8/13	79.43	79.25	5.2-15.2	N/A	7.40	0	71.85
RW-02	8/8/13	79.55	79.22	5.1-15.1	Well not accessible for monitoring			
RW-03	8/8/13	79.23	79.09	5.12-15.12	Well not accessible for monitoring			
RW-04	8/8/13	79.35	78.98	5.81-15.81	6.93	9.2	2.27	71.64
RW-05	8/8/13	79.54	79.19	5.12-15.12	6.82	9.37	2.55	71.91
RW-06	8/8/13	77.69	77.59	5-10	4.13	8.15	4.02	72.74
MW-01	8/8/13	76.57	76.29	4-14	N/A	6.28	0	70.01
MW-02	8/8/13	79.71	79.38	4-14	N/A	6.68	0	72.70
MW-03	8/8/13	80.22	79.94	4-14	N/A	6.25	0	73.69
MW-04	8/8/13	77.12	76.78	4-14	2.91	4.61	1.70	73.56
MW-05	8/8/13	79.30	78.92	4-14	N/A	7.28	0	71.64
MW-06	8/8/13	79.28	78.92	4-14	N/A	7.80	0	71.12
MW-07	8/8/13	79.09	78.74	5-15	N/A	5.71	0	73.03

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
MW-08	8/8/13	80.15	79.90	5-15	N/A	5.84	0	74.06
MW-09A	8/8/13	80.54	80.30	4-14	N/A	6.17	0	74.13
Enhanced Fluid Recovery Events 4 and 5, December 9, 2013 – Before Recovery								
RW-01	12/9/13	79.43	79.25	5.2-15.2	N/A	7.87	0	71.38
RW-02	12/9/13	79.55	79.22	5.1-15.1	N/A	8.16	0	71.06
RW-03	12/9/13	79.23	79.09	5.12-15.12	N/A	8.23	0	70.86
RW-04	12/9/13	79.35	78.98	5.81-15.81	7.44	9.89	2.45	71.10
RW-05	12/9/13	79.54	79.19	5.12-15.12	7.67	9.27	1.60	71.23
RW-06	12/9/13	77.69	77.59	5-10	4.87	8.76	3.89	72.02
MW-01	12/9/13	76.57	76.29	4-14	N/A	6.21	0	70.08
MW-02	12/9/13	79.71	79.38	4-14	N/A	7.02	0	72.36
MW-03	12/9/13	80.22	79.94	4-14	N/A	7.26	0	72.68
MW-04	12/9/13	77.12	76.78	4-14	3.81	5.13	1.32	72.73
MW-05	12/9/13	79.30	78.92	4-14	N/A	7.78	0	71.14
MW-06	12/9/13	79.28	78.92	4-14	N/A	8.12	0	70.80
MW-07	12/9/13	79.09	78.74	5-15	N/A	6.41	0	72.33
MW-08	12/9/13	80.15	79.90	5-15	N/A	6.88	0	73.02
MW-09A	12/9/13	80.54	80.30	4-14	N/A	6.96	0	73.34
Enhanced Fluid Recovery Events 6 and 7, January 7, 2014 – Before Recovery								
RW-01	1/7/14	79.43	79.25	5.2-15.2	N/A	7.49	0	71.76
RW-02	1/7/14	79.55	79.22	5.1-15.1	N/A	7.66	0	71.56
RW-03	1/7/14	79.23	79.09	5.12-15.12	N/A	7.95	0	71.14
RW-04	1/7/14	79.35	78.98	5.81-15.81	7.28	8.37	1.09	71.50
RW-05	1/7/14	79.54	79.19	5.12-15.12	N/A	8.06	0	71.13
RW-06	1/7/14	77.69	77.59	5-10	4.94	5.80	0.86	72.50
MW-01	1/7/14	76.57	76.29	4-14	N/A	5.99	0	70.30
MW-02	1/7/14	79.71	79.38	4-14	N/A	6.53	0	72.85
MW-03	1/7/14	80.22	79.94	4-14	N/A	6.82	0	73.12
MW-04	1/7/14	77.12	76.78	4-14	3.68	4.42	0.74	72.97
MW-05	1/7/14	79.30	78.92	4-14	N/A	7.44	0	71.48
MW-06	1/7/14	79.28	78.92	4-14	N/A	7.84	0	71.08
MW-07	1/7/14	79.09	78.74	5-15	N/A	5.94	0	72.80
MW-08	1/7/14	80.15	79.90	5-15	N/A	6.24	0	73.66
MW-09A	1/7/14	80.54	80.30	4-14	N/A	6.49	0	73.71
Enhanced Fluid Recovery Event 8, February 10, 2014 – Before Recovery								
RW-01	2/10/14	79.43	79.25	5.2-15.2	N/A	7.68	0	71.57
RW-02	2/10/14	79.55	79.22	5.1-15.1	N/A	7.96	0	71.26

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
RW-03	2/10/14	79.23	79.09	5.12-15.12	N/A	8.12	0	70.97
RW-04	2/10/14	79.35	78.98	5.81-15.81	7.47	9.92	2.45	71.37
RW-05	2/10/14	79.54	79.19	5.12-15.12	7.70	8.44	0.74	71.36
RW-06	2/10/14	77.69	77.59	5-10	5.12	6.32	1.20	72.25
MW-01	2/10/14	76.57	76.29	4-14	N/A	6.38	0	69.91
MW-02	2/10/14	79.71	79.38	4-14	N/A	6.86	0	72.52
MW-03	2/10/14	80.22	79.94	4-14	N/A	7.13	0	72.81
MW-04	2/10/14	77.12	76.78	4-14	3.75	4.70	0.95	72.86
MW-05	2/10/14	79.30	78.92	4-14	N/A	7.63	0	71.29
MW-06	2/10/14	79.28	78.92	4-14	N/A	8.01	0	71.29
MW-07	2/10/14	79.09	78.74	5-15	N/A	6.21	0	72.53
MW-08	2/10/14	80.15	79.90	5-15	N/A	6.65	0	73.25
MW-09A	2/10/14	80.54	80.30	4-14	N/A	6.83	0	73.47
Enhanced Fluid Recovery Event 9, February 11, 2014 – Before Recovery								
RW-01	2/11/14	79.43	79.25	5.2-15.2	N/A	7.77	0	71.48
RW-02	2/11/14	79.55	79.22	5.1-15.1	N/A	8.02	0	71.20
RW-03	2/11/14	79.23	79.09	5.12-15.12	N/A	8.15	0	70.94
RW-04	2/11/14	79.35	78.98	5.81-15.81	N/A	7.05	0	71.93
RW-05	2/11/14	79.54	79.19	5.12-15.12	N/A	5.87	0	73.32
RW-06	2/11/14	77.69	77.59	5-10	N/A	4.84	0	72.75
MW-01	2/11/14	76.57	76.29	4-14	N/A	6.36	0	69.93
MW-02	2/11/14	79.71	79.38	4-14	N/A	6.89	0	72.49
MW-03	2/11/14	80.22	79.94	4-14	N/A	7.15	0	72.79
MW-04	2/11/14	77.12	76.78	4-14	N/A	3.98	0	72.80
MW-05	2/11/14	79.30	78.92	4-14	N/A	7.69	0	71.23
MW-06	2/11/14	79.28	78.92	4-14	N/A	8.07	0	70.85
MW-07	2/11/14	79.09	78.74	5-15	N/A	6.24	0	72.50
MW-08	2/11/14	8.15	79.90	5-15	N/A	6.67	0	73.23
MW-09A	2/11/14	80.54	80.30	4-14	N/A	6.85	0	73.45
Enhanced Fluid Recovery Event 10, February 12, 2014 – Before Recovery								
RW-01	2/12/14	79.43	79.25	5.2-15.2	N/A	7.68	0	71.57
RW-02	2/12/14	79.55	79.22	5.1-15.1	N/A	7.71	0	71.51
RW-03	2/12/14	79.23	79.09	5.12-15.12	N/A	7.96	0	71.13
RW-04	2/12/14	79.35	78.98	5.81-15.81	N/A	6.96	0	72.02
RW-05	2/12/14	79.54	79.19	5.12-15.12	N/A	6.64	0	72.55
RW-06	2/12/14	77.69	77.59	5-10	N/A	4.06	0	73.53
MW-01	2/12/14	76.57	76.29	4-14	N/A	6.26	0	70.03

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
MW-02	2/12/14	79.71	79.38	4-14	Well not accessible			
MW-03	2/12/14	80.22	79.94	4-14	N/A	6.58	0	73.36
MW-04	2/12/14	77.12	76.78	4-14	N/A	1.98	0	74.80
MW-05	2/12/14	79.30	78.92	4-14	N/A	7.53	0	71.39
MW-06	2/12/14	79.28	78.92	4-14	N/A	7.90	0	71.02
MW-07	2/12/14	79.09	78.74	5-15	N/A	6.14	0	72.60
MW-08	2/12/14	80.15	79.90	5-15	N/A	6.63	0	73.27
MW-09A	2/12/14	80.54	80.30	4-14	N/A	6.80	0	73.50
Enhanced Fluid Recovery Event 11, February 13, 2014 – Before Recovery								
RW-01	2/13/14	79.43	79.25	5.2-15.2	N/A	7.59	0	71.66
RW-02	2/13/14	79.55	79.22	5.1-15.1	N/A	7.84	0	71.38
RW-03	2/13/14	79.23	79.09	5.12-15.12	N/A	8.05	0	71.04
RW-04	2/13/14	79.35	78.98	5.81-15.81	N/A	7.53	0	71.45
RW-05	2/13/14	79.54	79.19	5.12-15.12	N/A	7.71	0	71.48
RW-06	2/13/14	77.69	77.59	5-10	N/A	2.95	0	74.64
MW-01	2/13/14	76.57	76.29	4-14	N/A	6.26	0	70.03
MW-02	2/13/14	79.71	79.38	4-14	N/A	6.75	0	72.63
MW-03	2/13/14	80.22	79.94	4-14	N/A	6.99	0	72.95
MW-04	2/13/14	77.12	76.78	4-14	N/A	1.81	0	74.97
MW-05	2/13/14	79.30	78.92	4-14	N/A	7.59	0	71.33
MW-06	2/13/14	79.28	78.92	4-14	N/A	7.98	0	70.94
MW-07	2/13/14	79.09	78.74	5-15	N/A	6.14	0	72.60
MW-08	2/13/14	80.15	79.90	5-15	N/A	6.58	0	73.32
MW-09A	2/13/14	80.54	80.30	4-14	N/A	6.74	0	73.56
Enhanced Fluid Recovery Event 12, February 16, 2014 – Before Recovery								
RW-01	2/16/14	79.43	79.25	5.2-15.2	N/A	7.70	0	71.55
RW-02	2/16/14	79.55	79.22	5.1-15.1	N/A	7.95	0	71.27
RW-03	2/16/14	79.23	79.09	5.12-15.12	N/A	8.11	0	70.98
RW-04	2/16/14	79.35	78.98	5.81-15.81	7.65	7.67	0.02	71.33
RW-05	2/16/14	79.54	79.19	5.12-15.12	7.39	7.41	0.02	71.80
RW-06	2/16/14	77.69	77.59	5-10	N/A	5.26	0	72.33
MW-01	2/16/14	76.57	76.29	4-14	N/A	6.32	0	69.97
MW-02	2/16/14	79.71	79.38	4-14	N/A	6.82	0	72.56
MW-03	2/16/14	80.22	79.94	4-14	N/A	7.09	0	72.65
MW-04	2/16/14	77.12	76.78	4-14	N/A	2.60	0	74.18
MW-05	2/16/14	79.30	78.92	4-14	N/A	7.66	0	71.26
MW-06	2/16/14	79.28	78.92	4-14	N/A	8.03	0	70.89

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
MW-07	2/16/14	79.09	78.74	5-15	N/A	6.24	0	72.50
MW-08	2/16/14	80.15	79.90	5-15	N/A	6.68	0	73.22
MW-09A	2/16/14	80.54	80.30	4-14	N/A	6.83	0	73.47
Enhanced Fluid Recovery Event 13, February 17, 2014 – Before Recovery								
RW-01	2/17/14	79.43	79.25	5.2-15.2	N/A	7.71	0	71.54
RW-02	2/17/14	79.55	79.22	5.1-15.1	N/A	7.97	0	71.25
RW-03	2/17/14	79.23	79.09	5.12-15.12	N/A	8.12	0	70.97
RW-04	2/17/14	79.35	78.98	5.81-15.81	N/A	7.70	0	71.28
RW-05	2/17/14	79.54	79.19	5.12-15.12	N/A	7.89	0	71.30
RW-06	2/17/14	77.69	77.59	5-10	N/A	5.37	0	72.22
MW-01	2/17/14	76.57	76.29	4-14	N/A	6.34	0	69.95
MW-02	2/17/14	79.71	79.38	4-14	N/A	6.84	0	72.54
MW-03	2/17/14	80.22	79.94	4-14	N/A	7.11	0	72.83
MW-04	2/17/14	77.12	76.78	4-14	N/A	3.38	0	73.40
MW-05	2/17/14	79.30	78.92	4-14	N/A	7.67	0	71.25
MW-06	2/17/14	79.28	78.92	4-14	N/A	8.01	0	70.91
MW-07	2/17/14	79.09	78.74	5-15	N/A	6.23	0	72.51
MW-08	2/17/14	80.15	79.90	5-15	N/A	6.69	0	73.21
MW-09A	2/17/14	80.54	80.30	4-14	N/A	6.83	0	73.47
Enhanced Fluid Recovery Event 14, February 18, 2014 – Before Recovery								
RW-01	2/18/14	79.43	79.25	5.2-15.2	N/A	7.74	0	71.51
RW-02	2/18/14	79.55	79.22	5.1-15.1	N/A	7.94	0	71.28
RW-03	2/18/14	79.23	79.09	5.12-15.12	N/A	8.11	0	70.98
RW-04	2/18/14	79.35	78.98	5.81-15.81	N/A	7.70	0	71.28
RW-05	2/18/14	79.54	79.19	5.12-15.12	N/A	7.91	0	71.28
RW-06	2/18/14	77.69	77.59	5-10	N/A	5.43	0	72.16
MW-01	2/18/14	76.57	76.29	4-14	N/A	6.33	0	69.96
MW-02	2/18/14	79.71	79.38	4-14	N/A	6.86	0	72.52
MW-03	2/18/14	80.22	79.94	4-14	N/A	7.13	0	72.81
MW-04	2/18/14	77.12	76.78	4-14	N/A	3.73	0	73.05
MW-05	2/18/14	79.30	78.92	4-14	N/A	7.66	0	71.26
MW-06	2/18/14	79.28	78.92	4-14	N/A	8.02	0	70.90
MW-07	2/18/14	79.09	78.74	5-15	N/A	6.23	0	72.51
MW-08	2/18/14	80.15	79.90	5-15	N/A	6.69	0	73.21
MW-09A	2/18/14	80.54	80.30	4-14	N/A	6.85	0	73.45
Groundwater Monitoring May 7, 2014								
RW-01	5/7/14	79.43	79.25	5.2-15.2	N/A	7.38	0	71.87

Table 5 Groundwater Elevations
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314 (continued)

Well Number	Date	Ground Surface Elevation (ft.)	Top of Casing Elevation (ft.)	Depth of Screened Interval (ft.)	Depth to Free Product (ft. TOC)	Depth to Water (ft. TOC)	Product Thickness (ft.)	Corrected Groundwater Elevation (ft.)
RW-02	5/7/14	79.55	79.22	5.1-15.1	Well not accessible			
RW-03	5/7/14	79.23	79.09	5.12-15.12	Well not accessible			
RW-04	5/7/14	79.35	78.98	5.81-15.81	7.19	8.61	1.42	71.53
RW-05	5/7/14	79.54	79.19	5.12-15.12	7.31	7.38	0.07	71.87
RW-06	5/7/14	77.69	77.59	5-10	4.68	5.81	1.13	72.79
MW-01	5/7/14	76.57	76.29	4-14	N/A	6.03	0	70.26
MW-02	5/7/14	79.71	79.38	4-14	N/A	6.69	0	71.69
MW-03	5/7/14	80.22	79.94	4-14	N/A	6.21	0	73.43
MW-04	5/7/14	77.12	76.78	4-14	N/A	2.65	0	74.13
MW-05	5/7/14	79.30	78.92	4-14	N/A	7.32	0	71.60
MW-06	5/7/14	79.28	78.92	4-14	N/A	7.45	0	71.47
MW-07	5/7/14	79.09	78.74	5-15	N/A	5.76	0	72.98
MW-08	5/7/14	80.15	79.90	5-15	N/A	5.92	0	73.98
MW-09A	5/7/14	80.54	80.30	4-14	N/A	6.20	0	74.10

Prepared by Jeffrey C. Williams, PE Date: June 5, 2014
Reviewed by Doug Hawn Date: June 6, 2014

NOTE:
Corrected Groundwater Elevation = Top of casing elevation – Depth to water + (Specific gravity x Product Thickness)
Fuel oil's specific gravity of 0.82 was used.
ft. = foot or feet MW = monitor well
RW = recovery well TOC = top of casing

Table 6 Preliminary Assessment and Site Investigation Groundwater Analytical Results, April 2011
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Well Number	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)
MW-01-01	4/12/11	0.140U	0.190U	0.150U	0.220U	ND
MW-02-02	4/12/11	0.140U	0.190U	0.150U	0.220U	ND
MW-03-03	4/12/11	0.140U	0.190U	0.150U	0.220U	ND
MW-04-04	4/12/11	3.67	0.839J	**19.8**	**112**	136.309
MW-05-05	4/12/11	0.140U	0.190U	0.150U	0.220U	ND
MW-05-059*	4/12/11	0.140U	0.190U	0.150U	0.220U	ND
MW-06-06	4/12/11	0.140U	0.190U	0.150U	0.220U	ND
Applicable Standards		5 (MCL) 51 (ISWQS)	1,000 (MCL)	700 (MCL)	N/A	N/A
GUST Detection Limits		5	5	5	5	N/A

Prepared by Jeffrey C. Williams, PE Date: June 5, 2014
Reviewed by Doug Hawn Date: June 6, 2014
NOTES:
* MW-059 is a duplicate sample of MW-05-05.
Applicable standard is Drinking Water Maximum Contaminant Level and the Georgia In-Stream Water Quality Standard.
Bold text indicates exceedances.
µg/L = micrograms per liter BTEX = benzene, toluene, ethylbenzene, xylenes
ISWQS = In-Stream Water Quality Standard N/A = not applicable
U = concentration not detected equal to or greater than lab detection limit of 5 µg/L for BTEX components

Table 7 Preliminary Assessment and Site Investigation Groundwater Analytical Results for Polynuclear Aromatic Hydrocarbons, April 2011
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave., Liberty County, Fort Stewart, Georgia 31314

Sample Location	Date Sampled	Acenaphthene (µg/L)	Acenapthylene (µg/L)	Anthracene (µg/L)	Benzo(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(g,h,i)perylene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	Indeno(1,2,3-cd)pyrene (µg/L)	1-Methylnaphthalene (µg/L)	2-Methylnaphthalene (µg/L)	Naphthanlene (µg/L)	Phenanthrene (µg/L)	Pyrene (µg/L)
MW-01-01	4/12/11	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U
MW-02-02	4/12/11	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ	0.0472UJ
MW-03-03	4/12/11	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0563J
MW-04-04	4/12/11	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.0463UJ	0.414 U	0.110 U	0.0463UJ	0.0463UJ	0.139 J
MW-05-05	4/12/11	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U
MW-05-059	4/12/11	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U	0.0467 U
MW-06-06	4/12/11	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Georgia In-Stream Water Quality Standard (µg/L)		NRC	NRC	110,000	NRC	NRC	NRC	NRC	NRC	NRC	NRC	370	14,000	NRC	NRC	NRC	NRC	NRC	11,000
GUST Detection Limit µg/L)		**10.00**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**N/A**	**N/A**	**10**	**10**	**10**

Prepared by Jeffrey C. Williams, PE — Date: June 5, 2014
Reviewed by Doug Hawn — Date: June 6, 2014

NOTES:
* MW-05-059 is a duplicate sample of MW-05-05.
U denotes.
J = laboratory-estimated value
N/A = not applicable
U = concentration not detected equal to or greater than lab detection limit shown
MW = monitor well
NRC = No regulatory criteria

Table 8 Building 419, Free Product Removal – Enhanced Fluid Recovery Events
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Date	Hydrocarbons Removed – Vapor (pounds)	Hydrocarbons Removed – Liquid (gallons)	Total Hydrocarbons Removed (equivalent-gallons)	Total Liquids Removed (gallons)
6/12/11	96	0	14	2,573
7/17/11	199	0	28	2,600
8/6/11	316	0	48	2,494

Prepared by Jeffrey C. Williams, PE Date: June 5, 2014
Reviewed by Doug Hawn Date: June 6, 2014

Table 9 Site Investigation Soil Analytical Results, July–August 2013
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Sample Location	Depth (ft.)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH DRO (mg/kg)	MTBE (mg/kg)
SB-22-0103	1-3	7/30/13	**0.0717 UJ**	**0.0717 UJ**	**0.0717 UJ**	**0.215 UJ**	ND	**41.1 U**	0.0717 UJ
SB-229-0103	1-3	7/30/13	0.00168 U	0.00168 U	0.00168 U	**0.00505 U**	ND	**18.3J**	0.00168 U
SB-22-0708	7-8	7/30/13	0.00128 U	0.00128 U	0.00128 U	0.00385 U	ND	**17.3 J**	0.00128 U
SB-23-0103	1-3	7/30/13	**0.0968 U**	**0.0968 U**	**0.0968 U**	**0.290 U**	ND	**46.0 J**	0.0968 U
SB-23-0708	7-8	7/30/13	0.00125 U	0.00125 U	0.00125 U	0.00374 U	ND	8.61 U	0.00125 U
SB-24-0103	1-3	7/30/13	0.00117 U	0.00117 U	0.00117 U	0.00350 U	ND	**39.7 J**	0.00117 U
SB-24-1012	10-12	7/30/13	0.00165 U	0.00165 U	0.00165 U	0.00496 U	ND	**42.3**	0.00165 U
SB-25-0103	1-3	8/5/13	0.00143 U	0.00143 U	0.00143 U	0.00428 U	ND	**20.9 J**	0.00143 U
SB-25-0708	7-8	8/5/13	0.00124 U	0.00124 U	0.00124 U	0.00371 U	ND	**10.6 J**	0.00124 U
Applicable Standards: Table A			0.008	6.00	10.00	700.00	N/A	N/A	N/A
GUST Detection Limits			0.005	0.005	0.005	0.005	N/A	10	N/A

Prepared by Jeffrey C. Williams, PE — Date: June 5, 2014
Reviewed by Doug Hawn — Date: June 6, 2014

NOTES:
* SB-229-0103 is a duplicate sample of SB-22-0103.
Applicable standard is GUST-CAP A Guidelines, Table A for average or higher susceptibility area where public water supplies exist within 2.0 miles or nonpublic water supplies exist within 0.5 miles and the site is more than 500 feet from a withdrawal point.
Bold value denotes concentration exceeded GUST detection limit. Shaded value denotes concentration exceeded Applicable Table A standard.
U denotes concentration not detected equal to or greater that lab detection limit.
J denotes laboratory estimated value.

BTEX = benzene, toluene, ethylbenzene, xylenes
ft. = foot or feet
MTBE = methyl tertbutyl ether
N/A = not applicable
SB = soil boring
DRO = diesel range organics
J = laboratory-estimated value
mg/ kg = milligrams per kilogram
ND = not detected
TPH = total petroleum hydrocarbons

Table 10 Site Investigation Soil Analytical Results for Polynuclear Aromatic Hydrocarbons, July 2013
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave., Liberty County, Fort Stewart, Georgia 31314

Sample Location	Depth (ft.)	Date Sampled	Acenaphthene (mg/kg)	Acenapthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(g,h,i)perylene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenz(a,h)anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(1,2,3-cd)pyrene (mg/kg)	Naphthanlene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
SB-22-0103	1-3	7/30/13	0.00216 U	0.009	0.00216 U	0.012	0.0148	0.0201	0.0115	0.0218	0.0170	0.00923	0.0185 J	0.00216 U	0.0121	0.00216 U	0.00216 U	0.0294 J
SB-229-0103	1-3	7/30/13	0.00233 U	0.00468 J	0.00233 U	0.00233 U	0.00233 U	0.0109	0.00627 J	0.00974	0.00571 J	0.00905 J	0.00544 J	0.00233 U	0.00493 J	0.00233 U	0.00233 U	0.00715 J
SB-22-0708	7-8	7/30/13	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U	0.00226 U
SB-23-0103	1-3	7/30/13	0.00238 U	0.0337	0.0145	0.0449	0.0683	0.0658	0.0352	0.0748	0.0648	0.0123	0.0751	0.00238 U	0.0367	0.0130	0.0199	0.134
SB-23-0708	7-8	7/30/13	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U
SB-24-0103	1-3	7/30/13	0.00503 J	0.131	0.0543	0.247	0.312	0.271	0.154	0.254	0.322	0.0511	0.370	0.00517 J	0.156	0.0134	0.0686	0.616
SB-24-1012	10-12	7/30/13	0.0118 U	0.0118 U	0.0018 U	0.0303 J	0.0118 U	0.0124 J	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0766
SB-25-0103	1-3	8/5/13	0.00198 U	0.00504J	0.00278 J	0.00633 J	0.007 J	0.0166	0.0102 UB	0.0122	0.017	0.00389 J	0.0169	0.00241J	0.0124 UB	0.00648 J	0.0128	0.0207
SB-25-0708	7-8	8/5/13	0.00215 U	0.00215 U	0.00215 U	0.00215 U	0.00215 U	0.00215 U	0.00489 UB	0.00215 U	0.00215 U	0.00215 U	0.00349 J	0.00215 U	0.00392 UB	0.00215 U	0.00303 J	0.00564 J
Applicable Standards: Table A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GUST Detection Limit			0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660

Prepared by Jeffrey C. Williams, PE Date: June 5, 2014
Reviewed by Doug Hawn Date: June 6, 2014

NOTES:
SB-229-0103 is a duplicate sample of SB-22-0103.
Applicable standard is GUST-CAP A Guidelines, Table A for average or higher susceptibility area where public water supplies exist within 2.0 miles or nonpublic water supplies exist within 0.5 miles and the site is more than 500 feet to a withdrawal point.
GUST = Georgia Underground Storage Tank
J = laboratory-estimated value
U = concentration not detected equal to or greater than lab detection limit
ft. = foot or feet
mg/ kg = milligrams per kilogram
UB = the analyte was found in the associated method blank as well as the sample above the QC level

Table 11 Site Investigation Groundwater Analytical Results, August 2013
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave.,
Liberty County, Fort Stewart, Georgia 31314

Well Number	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)	MTBE (µg/L)
MW-07	8/8/13	0.250U	0.250U	0.250U	0.750U	ND	0.250U
MW-08	8/8/13	0.250U	0.250U	0.250U	0.750U	ND	0.250U
MW-089	8/8/13	0.250U	0.250U	0.250U	0.750U	ND	0.250U
MW-09A	8/8/13	0.250U	0.250U	0.250U	0.750U	ND	0.250U
Applicable Standards		5 (MCL) 51 (ISWQS)	1,000 (MCL)	700 (MCL)	N/A	N/A	N/A
GUST Detection Limits		5	5	5	5	N/A	N/A

Prepared by Jeffrey C. Williams, PE Date: June 5, 2014
Reviewed by Doug Hawn Date: June 6, 2014

NOTES:
* MW-89 is a duplicate sample of MW-8.
Applicable standard is Drinking Water Maximum Contaminant Level and the Georgia In-Stream Water Quality Standard.
U denotes concentration not detected at lab detection limit shown.

µg/L = micrograms per liter
GUST = Georgia Underground Storage Tank
MCL = Maximum Contaminant Level
MW = monitor well
ND = not detected
BTEX = benzene, toluene, ethylbenzene, xylenes
ISWQS = In-Stream Water Quality Standard
MTBE = methyl tertbutyl ether
N/A = not applicable
U = concentration not detected at lab detection limit shown

Table 12 Site Investigation Groundwater Analytical Results for Polynuclear Aromatic Hydrocarbons, August 2013
AAFES Furniture Store, Heating Oil UST, Building 419 Steele Ave., Liberty County, Fort Stewart, Georgia 31314

Sample Location	Date Sampled	Acenaphthene (µg/L)	Acenapthylene (µg/L)	Anthracene (µg/L)	Benzo(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(g,h,i)perylene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	Indeno(1,2,3-cd)pyrene (µg/L)	Naphthanlene (µg/L)	Phenanthrene (µg/L)	Pyrene (µg/L)
MW-07	8/8/13	0.050U	0.050U	0.050U	0.050U	0.050U	0.050U	0.050U	0.050U	0.050U	0.050U	0.0633J	0.050U	0.050U	0.050U	0.100U	0.050U
MW-08	8/8/13	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0474J	0.0463U	0.0463U	0.0463U	0.0926U	0.0463U
MW-089	8/8/13	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0463U	0.0556J	0.0463U	0.0463U	0.0463U	0.0926U	0.0582J
MW-09A	8/8/13	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0481U	0.0962U	0.0481U
Georgia In-Stream Water Quality Standard (µg/L)		NRC	NRC	110,000	NRC	NRC	NRC	NRC	NRC	NRC	NRC	370	14,000	NRC	NRC	NRC	11,000
GUST Minimum Detection Limit (µg/L)		**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**

Prepared by Jeffrey C. Williams, PE — Date: June 5, 2014
Reviewed by Doug Hawn — Date: June 6, 2014

NOTES:
* MW-89 is a duplicate sample of MW-8.
Applicable standards are Drinking Water Maximum Contaminant Level (MCL) and the Georgia In-Stream Water Quality Standard (ISWQS).
µg/ L = micrograms per liter
J = laboratory-estimated value
NRC = no regulatory criteria
GUST = Georgia Underground Storage Tank
MW = monitor well
U = concentration not detected equal to or greater that laboratory detection limit

APPENDIX III

ECOVAC Services

Pilot Test Results

ECOVAC SERVICES
The World Leader in Mobile Dual-Phase/Multi-Phase Extraction and
Patented SURFAC®/ISCO-EFR®/COSOLV® Technologies
Treatability Studies/Research & Development

December 20, 2013

Mr. Doug Hawn
SpecPro Environmental
1006 Floyd Culler Court
Oak Ridge, Tennessee 37830
dhawn@specproenv.com

Subject: **REVISED--SURFAC® Pilot Test Results**
Event Nos. 4 and 5
Building 419
Fort Stewart, Georgia

Dear Mr. Hawn:

Please find attached the data summary for the SURFAC® pilot tests conducted at the subject site on December 9, 2013 and December 10, 2013. Three previous EFR® events have been conducted at the subject site from June 12, 2011 and August 6, 2011.

EcoVac Services' **patented SURFAC®** process is the combination of dual-phase/multi-phase extraction (DPE/MPE) and surfactant injection/capture. SURFAC® is effective in removing separate-phase hydrocarbons (SPH) as well as reducing elevated dissolved hydrocarbon concentrations. EcoVac Services employs its EFR® process for the DPE/MPE component of EcoVac Services' patented SURFAC® process. The following summarizes the results of the pilot test at this site.

SUMMARY OF RESULTS

SURFAC® Pilot Test – Event No. 4 (December 9, 2013)

Separate-phase hydrocarbons (SPH) were detected in four of the gauged wells (MW-04 – 1.25 feet, RW-04 – 2.19 feet, RW-05 – 1.56 feet, and RW-06 – 3.88 feet) prior to conducting this SURFAC® pilot test. This pilot test was conducted for eight hours at two extraction points, consisting of the initial four hours of extraction at MW-04 and the final four hours of this pilot test at RW-04. SPH was detected in RW-05 (1.56 feet) and RW-06 (3.66 feet) upon completion of this test.

A calculated total of 167 pounds of petroleum hydrocarbons (approximately 25 equivalent gallons of diesel fuel/gasoline) was removed during this pilot test. The hydrocarbon/groundwater removal rates and in-well vacuums are summarized below in order of extraction:

Extraction Wells	In-Well Vacuums	Hydrocarbon Removal Rate	Groundwater Recovery Rate (Extraction Time)
MW-04	16 in. Hg	0.5 to 8.8 lbs/hr	2.2 GPM (4.0 hrs.)
RW-04	14 in. Hg	18 to 64 lbs/hr	2.2 GPM (4.0 hrs.)

GPM - gallons per minute
Hg - mercury

105 Weatherstone Drive, Suite 610 - Woodstock, Georgia 30188
(770) 592-1001 - Fax (770) 592-1801
www.ecovacservices.com

Vapor concentrations ranged from 980 to 100,000 parts per million by volume (PPM_V) during this test. Vapor flow rates ranged from 29 to 69 cubic feet per minute (CFM) throughout the pilot test.

Differential pressures were recorded at adjacent monitor wells during the pilot test to assess the vacuum influence induced during extraction. The differential pressure data is detailed in the attached data table and summarized below:

Extraction from MW-04

Monitor Well	Maximum Vacuum	Approximate Distance From MW-04
RW-06	-0.10 inch of water	31 feet
RW-05	-1.00 inch of water	75 feet
MW-05	0.00 inch of water	110 feet
RW-03	0.00 inch of water	115 feet
RW-02	0.00 inch of water	135 feet

Extraction from RW-04

Monitor Well	Maximum Vacuum	Approximate Distance From RW-04
RW-05	-1.95 inches of water	13 feet
RW-03	-0.96 inch of water	39 feet
RW-02	-0.22 inch of water	45 feet
MW-06	0.00 inch of water	58 feet
MW-05	0.00 inch of water	67 feet

Groundwater levels were also recorded during the pilot test to assess the groundwater drawdown induced during extraction. The drawdown data is detailed in the attached table and summarized below.

Extraction from MW-04

Monitor Well	Maximum Change	Approximate Distance From MW-04
RW-06	-0.71/-0.15 feet *	31 feet
RW-05	-0.16/+0.21 feet *	75 feet
MW-05	-0.09 feet	110 feet
MW-06	0.00 feet	112 feet
RW-03	-0.03 feet	115 feet
RW-02	-0.01 feet	135 feet

Extraction from RW-04

Monitor Well	Maximum Change	Approximate Distance From RW-04
RW-05	0.00/-2.23 feet *	13 feet
RW-03	-0.62 feet	39 feet
RW-02	-0.39 feet	45 feet
RW-06	-0.22/-0.71 feet*	52 feet
MW-06	-0.18 feet	58 feet
MW-05	-0.32 feet	67 feet

*Change in SPH thickness/change in water level

Approximately 1,019 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this pilot test.

SURFAC® Pilot Test – Event No. 5 (December 10, 2013)

SPH was detected in three of the gauged wells (MW-04 – 0.12 feet, RW-05 – 1.13 feet, and RW-06 – 3.86 feet) prior to conducting this SURFAC® pilot test. This pilot test was conducted for eight hours at two extraction points, consisting of the initial four hours of extraction at RW-06 and the final four hours of this pilot test at RW-05. SPH was detected in MW-04 (0.40 feet) and RW-04 (0.02 feet) upon completion of this test.

A calculated total of 94 pounds of petroleum hydrocarbons (approximately 14 equivalent gallons of diesel fuel/gasoline) was removed during this pilot test. The hydrocarbon/groundwater removal rates and in-well vacuums are summarized below in order of extraction:

Extraction Wells	In-Well Vacuums	Hydrocarbon Removal Rate	Groundwater Recovery Rate (Extraction Time)
RW-06	23 in. Hg	1.9 to 9.6 lbs/hr	0.9 GPM (4.0 hrs.)
RW-05	8 to 9 in. Hg	5.6 to 58 lbs/hr	2.9 GPM (4.0 hrs.)

GPM - gallons per minute
Hg - mercury

Vapor concentrations ranged from 3,400 to 90,000 PPM_V during this test. Vapor flow rates ranged from 34 to 39 CFM throughout the pilot test.

Differential pressures were recorded at adjacent monitor wells during the pilot test to assess the vacuum influence induced during extraction. The differential pressure data is detailed in the attached data table and summarized below:

Extraction from RW-06

Monitor Well	Maximum Vacuum	Approximate Distance From RW-06
MW-04	0.00 inch of water	34 feet
RW-04	0.00 inch of water	57 feet
RW-03	0.00 inch of water	74 feet
MW-05	0.00 inch of water	75 feet
RW-02	0.00 inch of water	96 feet

Extraction from RW-05

Monitor Well	Maximum Vacuum	Approximate Distance From RW-05
RW-04	-1.02 inches of water	13 feet
RW-03	-0.22 inch of water	41 feet
MW-05	-0.00 inch of water	42 feet
RW-02	-0.04 inch of water	50 feet
MW-04	0.00 inch of water	75 feet

Groundwater levels were also recorded during the pilot test to assess the groundwater drawdown induced during extraction. The drawdown data is detailed in the attached table and summarized below.

Extraction from RW-06

Monitor Well	Maximum Change	Approximate Distance From RW-06
MW-04	-0.25/+0.37 feet *	34 feet
RW-04	-0.16/+0.02 feet *	57 feet
RW-03	-0.07 feet	74 feet
MW-05	-0.14 feet	75 feet
MW-06	-0.09 feet	96 feet
RW-02	-0.02 feet	96 feet

Extraction from RW-05

Monitor Well	Maximum Change	Approximate Distance From RW-05
RW-04	+0.02/-2.56 feet	13 feet
RW-03	-0.62 feet	41 feet
MW-05	-0.46 feet	42 feet
RW-02	-0.35 feet	50 feet
MW-06	-0.34 feet	65 feet
MW-04	+0.28/-0.18 feet *	75 feet

* Change in SPH thickness/change in water level

Approximately 909 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this pilot test.

Thank you for the continued opportunity to team with SpecPro in serving the environmental needs of your clients. We look forward to working with you again in the future to provide innovative and cost effective environmental solutions at this and other sites.

Sincerely,

EcoVac Services

David M. Goodrich, P.G.

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 4
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 12/9/13

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	17:15	Inlet	MW-04	RW-04							Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
MW-04	17:30	26	16	-							980	600	29	0.5	0.1
"	17:45	26	16	-							1,500	600	29	0.7	0.2
"	18:00	25	16	-							2,200	800	39	1.4	0.4
"	18:15	25	16	-							2,600	800	39	1.7	0.4
"	18:45	25	16	-							3,400	1,100	54	3.0	1.5
"	19:15	25	16	-							4,600	1,200	59	4.4	2.2
"	20:15	26	16	-							5,600	1,400	69	6.3	6.3
"	21:15	26	16	-							8,500	1,300	64	8.8	8.8
RW-04	21:30	25	-	14							100,000	800	39	64	16
"	21:45	25	-	14							100,000	800	39	64	16
"	22:00	25	-	14							100,000	800	39	64	16
"	22:15	25	-	14							100,000	800	39	64	16
"	22:45	25	-	14							82,000	700	34	46	23
"	23:15	24	-	14							78,000	700	34	44	22
"	0:15	24	-	14							44,000	600	29	21	21
"	1:15	24	-	14							37,000	600	29	18	18

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-04	2"	13.2	3.77	5.02	1.25	-	8.69	0.00	-4.61
MW-05	2"	13.8	-	7.74	0.00	-	8.06	0.00	-0.32
MW-06	2"	13.0	-	8.16	0.00	-	8.34	0.00	-0.18
RW-02	2"	14.4	-	8.13	0.00	-	8.52	0.00	-0.39
RW-03	2"		-	8.20	0.00	-	8.82	0.00	-0.62
RW-04	6"	15.4	7.40	9.59	2.19	-	11.49	0.00	-3.54
RW-05	6"	16.4	7.66	9.22	1.56	9.96	11.52	1.56	-2.30
RW-06	6"	10.3	4.80	8.68	3.88	5.56	9.22	3.66	-0.71

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	0 (closed)	8 feet	Hydrocarbons Removed (vapor):	167	pounds
Truck Operator:	Jeans	RW-04	0 (closed)	12 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	148				Total Hydrocarbons Removed:	25	equiv. gal.
Vacuum Pumps:	Becker				Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	419-1	
Stack I.D. (inches)	3.0				Total Liquids Removed:	1,019	gallons

ECOVAC SERVICES ENVIRONMENTAL REMEDIATION	Time: 17:15 to 01:15	Liquid Recovery:
	# Pumps: 2	MW-04 - 521 gallons (2.2 GPM)
	RPMs: 1,000	RW-04 - 498 gallons (2.1 GPM)
	Time:	
www.ecovacservices.com	# Pumps:	
770-592-1001	RPMs:	

Differential Pressure and Groundwater Drawdown Data Recorded During SURFAC®
Event #: 4 Date: 12/9/13
Facility Name: Building 419
Facility Address: Fort Stewart, Hinesville, Georgia

DIFFERENTIAL PRESSURE DATA

EXTRACTION FROM MW-04

		Well Designation:				
		RW-06	RW-05	MW-05	RW-03	RW-02
Nearest Extraction Well:		MW-04	MW-04	MW-04	MW-04	MW-04
Approximate Distance:		31 feet	75 feet	110 feet	115 feet	135 feet
Time	Elapsed Time	Differential Pressures (inches of water):				
18:15	1.0 hr.	-0.06	-1.00	0.00	0.00	0.00
19:15	2.0 hrs.	-0.04	-0.99	0.00	0.00	0.00
20:15	3.0 hrs.	-0.10	-0.90	0.00	0.00	0.00
Maximum Change:		-0.10	-1.00	0.00	0.00	0.00

EXTRACTION FROM RW-04

		Well Designation:				
		RW-05	RW-03	RW-02	MW-06	MW-05
Nearest Extraction Well:		RW-04	RW-04	RW-04	RW-04	RW-04
Approximate Distance:		13 feet	39 feet	45 feet	58 feet	67 feet
Time	Elapsed Time	Differential Pressures (inches of water):				
22:15	1.0 hr.	-1.22	-0.96	0.00	0.00	0.00
23:15	2.0 hrs.	-1.95	-0.29	0.00	0.00	0.00
0:15	3.0 hrs.	-1.01	-0.29	-0.22	0.00	0.00
Maximum Change:		-1.95	-0.96	-0.22	0.00	0.00

GROUNDWATER DRAWDOWN DATA

EXTRACTION FROM MW-04

		Well Designation:					
		RW-06	RW-05	MW-05	MW-06	RW-03	RW-02
Nearest Extraction Well:		MW-04	MW-04	MW-04	MW-04	MW-04	MW-04
Approximate Distance:		31 feet	75 feet	110 feet	112 feet	115 feet	135 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):					
Prior to EFR®		4.80/8.68 *	7.66/9.22 *	7.74	8.16	8.20	8.13
20:45	3.5 hrs.	5.55/9.28 *	7.77/9.54 *	7.83	8.16	8.23	8.14
Maximum Change:		-0.71/-0.15 **	-0.16/+0.21 **	-0.09	0.00	-0.03	-0.01

EXTRACTION FROM RW-04

		Well Designation:					
		RW-05	RW-03	RW-02	RW-06	MW-06	MW-05
Nearest Extraction Well:		RW-04	RW-04	RW-04	RW-04	RW-04	RW-04
Approximate Distance:		13 feet	39 feet	45 feet	52 feet	58 feet	67 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):					
Prior to EFR®		7.66/9.22 *	8.20	8.13	4.80/8.68 *	8.16	7.74
0:45	3.0 hrs.	9.96/11.52 *	8.82	8.52	5.56/9.22 *	8.34	8.06
Maximum Change:		0.00/-2.23 **	-0.62	-0.39	-0.22/-0.71 **	-0.18	-0.32

* Depth to SPH / Depth to Water

** Maximum change in SPH thickness / Maximum drawdown corrected for the presence of SPH

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 5
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 12/10/13

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	16:15	Inlet	RW-06	RW-05							Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
RW-06	16:30	26	23	-							14,000	700	34	7.8	2.0
"	16:45	26	23	-							15,000	800	39	9.6	2.4
"	17:00	26	23	-							14,000	800	39	8.9	2.2
"	17:15	26	23	-							12,000	800	39	7.7	1.9
"	17:45	26	23	-							12,000	800	39	7.7	3.8
"	18:15	26	23	-							7,800	800	39	5.0	2.5
"	19:15	26	23	-							5,600	700	34	3.1	3.1
"	20:15	26	23	-							3,400	700	34	1.9	1.9
RW-05	20:30	23	-	8							90,000	800	39	58	14
"	20:45	24	-	9							62,000	800	39	40	10
"	21:00	24	-	8							56,000	800	39	36	8.9
"	21:15	24	-	8							52,000	800	39	33	8.3
"	21:45	23	-	8							34,000	800	39	22	11
"	22:15	23	-	8							28,000	800	39	18	8.9
"	23:15	23	-	8							14,000	800	39	8.9	8.9
"	0:15	24	-	8							10,000	700	34	5.6	5.6

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-04	2"	13.2	3.94	4.06	0.12	4.05	4.45	0.40	-0.18
MW-05	2"	13.79	-	7.66	0.00	-	8.12	0.00	-0.46
MW-06	2"	13.04	-	8.01	0.00	-	8.35	0.00	-0.34
RW-02	2"	14.44	-	7.91	0.00	-	8.26	0.00	-0.35
RW-03	2"		-	8.08	0.00	-	8.70	0.00	-0.62
RW-04	2"	15.41	-	7.66	0.00	10.16	10.18	0.02	-2.52
RW-05	6"	16.4	7.67	8.80	1.13	-	9.42	0.00	-1.47
RW-06	6"	10.31	4.74	8.60	3.86	-	9.06	0.00	-3.36

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	RW-05	0 (cracked)	9 feet	Hydrocarbons Removed (vapor):	96	pounds
Truck Operator:	Jeans	RW-06	0 (cracked)	9 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	148				Total Hydrocarbons Removed:	15	equiv. gal.
Vacuum Pumps:	Becker				Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	N/A	
Stack I.D. (inches)	3.0				Total Liquids Removed:	909	gallons

www.ecovacservices.com	Time: 16:15 to 0:15	Liquid Recovery:
770-592-1001	# Pumps: 2	RW-05 - 686 gallons (2.9 GPM)
	RPMs: 1,000	RW-06 - 223 gallons (0.9 GPM)
	Time:	
	# Pumps:	
	RPMs:	

Differential Pressure and Groundwater Drawdown Data Recorded During SURFAC®
Event #: 5 Date: 12/10/13
Facility Name: Building 419
Facility Address: Fort Stewart, Hinesville, Georgia

DIFFERENTIAL PRESSURE DATA

EXTRACTION FROM RW-06

		Well Designation:				
		MW-04	RW-04	RW-03	MW-05	RW-02
Nearest Extraction Well:		RW-06	RW-06	RW-06	RW-06	RW-06
Approximate Distance:		34 feet	57 feet	74 feet	75 feet	96 feet
Time	Elapsed Time	Differential Pressures (inches of water):				
17:15	1.0 hr.	0.00	0.00	0.00	0.00	0.00
18:15	2.0 hrs.	0.00	0.00	0.00	0.00	0.00
19:15	3.0 hrs.	0.00	0.00	0.00	0.00	0.00
Maximum Change:		0.00	0.00	0.00	0.00	0.00

EXTRACTION FROM RW-05

		Well Designation:				
		RW-04	RW-03	MW-05	RW-02	MW-04
Nearest Extraction Well:		RW-05	RW-05	RW-05	RW-05	RW-05
Approximate Distance:		13 feet	41 feet	42 feet	50 feet	75 feet
Time	Elapsed Time	Differential Pressures (inches of water):				
21:15	1.0 hr.	-0.97	-0.21	0.00	-0.04	0.00
22:15	2.0 hrs.	-1.02	-0.22	0.00	-0.04	0.00
23:15	3.0 hrs.	-0.98	-0.22	0.00	-0.04	0.00
Maximum Change:		-1.02	-0.22	0.00	-0.04	0.00

GROUNDWATER DRAWDOWN DATA

EXTRACTION FROM RW-06

		Well Designation:					
		MW-04	RW-04	RW-03	MW-05	MW-06	RW-02
Nearest Extraction Well:		RW-06	RW-06	RW-06	RW-06	RW-06	RW-06
Approximate Distance:		34 feet	57 feet	74 feet	75 feet	96 feet	96 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):					
Prior to EFR®		3.94/4.06 *	7.66	8.08	7.66	8.01	7.91
20:45	3.5 hrs.	4.10/4.59 *	7.80/7.82 *	8.15	7.80	8.10	7.93
Maximum Change:		-0.25/+0.37 **	-0.16/+0.02 **	-0.07	-0.14	-0.09	-0.02

EXTRACTION FROM RW-05

		Well Designation:					
		RW-04	RW-03	MW-05	RW-02	MW-06	MW-04
Nearest Extraction Well:		RW-05	RW-05	RW-05	RW-05	RW-05	RW-05
Approximate Distance:		13 feet	41 feet	42 feet	50 feet	65 feet	75 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):					
Prior to EFR®		7.66	8.08	7.66	7.91	8.01	3.94/4.06 *
23:45	3.0 hrs.	10.16/10.18 *	8.70	8.12	8.26	8.35	4.05/4.45 *
Maximum Change:		+0.02/-2.52 **	-0.62	-0.46	-0.35	-0.34	+0.28/-0.18 **

* Depth to SPH / Depth to Water

** Maximum change in SPH thickness / Maximum drawdown corrected for the presence of SPH

CUMULATIVE EFR® DATA TABLE

Building 419

Fort Stewart, Georgia

	6/12/2011	7/17/2011	8/6/2011	12/9/2013	12/10/2013
SPH Thickness (ft.) MW-04	0.42	0.46	0.35	1.25	0.12
SPH Thickness (ft.) RW-01	0.25	0.05	0.00		
SPH Thickness (ft.) RW-04	4.50	2.26	1.40	2.19	0.00
SPH Thickness (ft.) RW-05	3.79	2.59	1.05	1.56	1.13
SPH Thickness (ft.) RW-06	1.02	0.47	0.47	3.88	3.86
Liquid Removed/Event (Gal.)	2,573	2,578	2,494	1,019	909
Cumulative Liquid Removed (Gal.)	2,573	5,151	7,645	8,664	9,573
Pounds Removed/Event	96	187	316	167	94
Cumulative Pounds Removed	96	283	599	766	860
Equiv. Gal. Gasoline Removed/Event	14	26	48	25	14
Cumulative Equiv. Gal. Removed	14	40	88	113	128

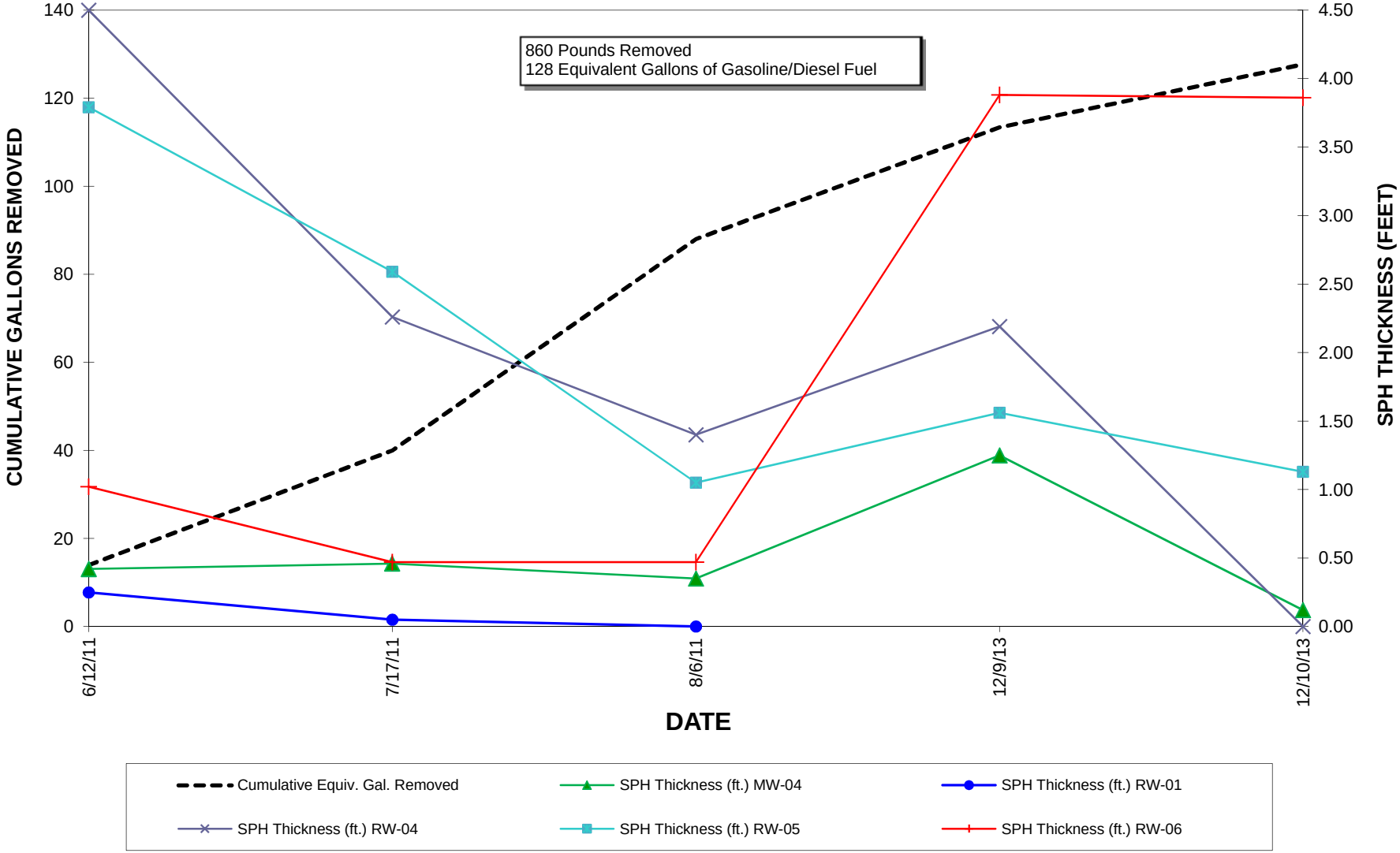
Not Gauged

Last Update: 12/20/2013

CUMULATIVE EFR® GRAPH

Building 419

Fort Stewart, Georgia



Last Update: 12/20/2013

ECOVAC SERVICES
The World Leader in Mobile Dual-Phase/Multi-Phase Extraction and Patented SURFAC®/ISCO-EFR®/COSOLV® Technologies
Treatability Studies/Research & Development

January 21, 2014

Mr. Doug Hawn
SpecPro Environmental
1006 Floyd Culler Court
Oak Ridge, Tennessee 37830
dhawn@specproenv.com

Subject: Enhanced Fluid Recovery (EFR®) Results
Event Nos. 6 and 7
Building 419
Fort Stewart, Georgia

Dear Mr. Hawn:

Please find attached the data summary for the sixth and seventh EFR® events conducted at the subject site on January 7, 2014 and January 8, 2014. Previous SURFAC® pilot tests were conducted at the subject site on December 9, 2013 and December 10, 2013. Three previous EFR® events have been conducted at the subject site from June 12, 2011 and August 6, 2011. The following summarizes the results of EFR® at this site.

SUMMARY OF RESULTS

EFR® Event No. 6 (January 7, 2014)

Separate-phase hydrocarbons (SPH) were detected in four of the gauged wells (MW-04 – 0.84 feet, RW-04 – 1.09 feet, RW-05 – 0.57 feet, and RW-06 – 0.86 feet) prior to conducting this EFR® event. This event was conducted for eight hours at four extraction points, consisting of MW-04, RW-04, RW-05, and RW-06. SPH was not detected in any of the gauged wells upon completion of this event.

A calculated total of 42 pounds of petroleum hydrocarbons (approximately 6.4 equivalent gallons of diesel fuel/gasoline) was removed during this event. Hydrocarbon removal rates ranged from 1.7 to 17 pounds per hour during this event.

Vapor concentrations ranged from 1,200 to 12,000 parts per million by volume (PPM_V) during this event. Vapor flow rates remained at 88 cubic feet per minute (CFM). In-well vacuums recorded at the extraction wells during this EFR® event are detailed in the EFR® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
MW-04	7 to 8 inches of mercury
RW-04	8 inches of mercury
RW-05	10 to 11 inches of mercury
RW-06	10 to 14 inches of mercury

Differential pressures were recorded during this event to assess the vacuum influence induced by EFR® in the vadose zone. The differential pressure data are detailed in the attached data table and summarized below:

Monitor Well	Maximum Change	Nearest Extraction Well (Approx. Distance)
RW-01	-1.36 inches of water	RW-4 (32 feet)
RW-03	-0.84 inch of water	RW-5 (38 feet)
MW-05	-0.07 inch of water	RW-5 (52 feet)

Groundwater levels were recorded during this event to assess the groundwater drawdown created by EFR®. The drawdown data are detailed in the attached table and summarized below:

Monitor Well	Maximum Change	Nearest Extraction Well (Approx. Distance)
RW-01	-1.14 feet	RW-4 (32 feet)
RW-03	-0.98 feet	RW-5 (38 feet)
MW-05	-0.73 feet	RW-5 (52 feet)

Approximately 2,417 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event.

EFR® Event No. 7 (January 8, 2014)

SPH was detected in four of the gauged wells (MW-04 – 0.14 feet, RW-04 – 0.01 feet, RW-05 – 0.01 feet, and RW-06 – 0.06 feet) prior to conducting this EFR® event. This event was conducted for eight hours at four extraction points, consisting of MW-04, RW-04, RW-05, and RW-06. SPH was not detected in any of the gauged wells upon completion of this event.

A calculated total of 10 pounds of petroleum hydrocarbons (approximately 1.6 equivalent gallons of diesel fuel/gasoline) was removed during this event. Hydrocarbon removal rates ranged from 0.8 to 4.6 pounds per hour with a trend of decreasing removal rates throughout this event.

Vapor concentrations ranged from 560 to 3,200 parts PPM_V during this event. Vapor flow rates remained at 88 CFM. In-well vacuums recorded at the extraction wells during this EFR® event are detailed in the EFR® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
MW-04	11 to 13 inches of mercury
RW-04	13 inches of mercury
RW-05	7 inches of mercury
RW-06	8 inches of mercury

Differential pressures were recorded during this event to assess the vacuum influence induced by EFR® in the vadose zone. The differential pressure data are detailed in the attached data table and summarized below:

Monitor Well	Maximum Change	Nearest Extraction Well (Approx. Distance)
RW-01	-1.30 inches of water	RW-4 (32 feet)
RW-03	-0.84 inch of water	RW-5 (38 feet)
MW-05	-0.11 inch of water	RW-5 (52 feet)

Groundwater levels were recorded during this event to assess the groundwater drawdown created by EFR®. The drawdown data are detailed in the attached table and summarized below:

Monitor Well	Maximum Change	Nearest Extraction Well (Approx. Distance)
RW-01	-0.93 feet	RW-4 (32 feet)
RW-03	-0.85 feet	RW-5 (38 feet)
MW-05	-0.61 feet	RW-5 (52 feet)

Approximately 2,253 gallons of liquid were removed during this pilot test and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event.

Thank you for the continued opportunity to team with SpecPro in serving the environmental needs of your clients. We look forward to working with you again in the future to provide innovative and cost effective environmental solutions at this and other sites.

Sincerely,

EcoVac Services

David M. Goodrich, P.G.

EFR® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 6
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 1/7/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	16:15	Inlet	MW-04	RW-04	RW-05	RW-06					Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
MW-04;	16:30	17	8	8	11	12					8,000	1,800	88	12	2.9
RW-04,05,06	16:45	17	8	8	11	12					10,000	1,800	88	14	3.6
"	17:00	17	7	8	10	14					12,000	1,800	88	17	4.3
"	17:15	17	7	8	10	14					10,000	1,800	88	14	3.6
"	17:45	17	7	8	10	14					8,200	1,800	88	12	5.9
"	18:15	17	7	8	10	14					6,000	1,800	88	8.6	4.3
"	19:15	17	7	8	10	14					3,800	1,800	88	5.5	5.5
"	20:15	17	7	8	10	12					2,400	1,800	88	3.5	3.5
"	21:15	17	7	8	10	10					2,000	1,800	88	2.9	2.9
"	22:15	17	7	8	10	11					1,600	1,800	88	2.3	2.3
"	23:15	17	7	8	10	11					1,400	1,800	88	2.0	2.0
"	0:15	17	7	8	10	11					1,200	1,800	88	1.7	1.7

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-01	2"	13.71	-	5.99	0.00				
MW-02	2"	14.23	-	6.53	0.00	-	6.76	0.00	-0.23
MW-03	2"	13.73	-	6.82	0.00	-	7.03	0.00	-0.21
MW-04	2"	13.2	3.58	4.42	0.84	-	6.75	0.00	-2.96
MW-05	2"	13.79	-	7.44	0.00	-	8.17	0.00	-0.73
MW-06	2"		-	7.84	0.00	-	8.62	0.00	-0.78
RW-01	4"	15.92	-	7.49	0.00	-	8.63	0.00	-1.14
RW-02	2"	14.44	-	7.66	0.00	-	8.34	0.00	-0.68
RW-03	2"		-	7.95	0.00	-	8.93	0.00	-0.98
RW-04	4"	15.41	7.28	8.37	1.09	-	10.87	0.00	-3.32
RW-05	4"	16.4	7.49	8.06	0.57	-	12.22	0.00	-4.59
RW-06	4"	10.31	4.94	5.80	0.86	-	8.61	0.00	-3.46

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	cracked	8 feet	Hydrocarbons Removed (vapor):	42	pounds
Truck Operator:	Jeans	RW-04	cracked	11 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	154	RW-05	cracked	11 feet	Total Hydrocarbons Removed:	6.4	equiv. gal.
Vacuum Pumps:	Becker	RW-06	0 (closed)	11 feet	Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	M27899	
Stack I.D. (inches)	3.0				Total Liquids Removed:	2,417	gallons

ECOVAC SERVICES ENVIRONMENTAL REMEDIATION	Time:	16:15 to 00:15
	# Pumps:	2
	RPMs:	900
	Time:	
www.ecovacservices.com	# Pumps:	
770-592-1001	RPMs:	

Differential Pressure and Groundwater Drawdown Data Recorded During EFR®
Event #: 6 Date: 1/7/14
Facility Name: Building 419
Facility Address: Fort Stewart, Hinesville, Georgia

DIFFERENTIAL PRESSURE DATA

		Well Designation:		
		RW-01	RW-03	MW-05
Nearest Extraction Well:		RW-04	RW-05	RW-05
Approximate Distance:		32 feet	38 feet	52 feet
Time	Elapsed Time	Differential Pressures (inches of water):		
17:15	1.0 hr.	-1.36	-0.82	-0.07
18:15	2.0 hrs.	-1.22	-0.75	-0.07
19:15	3.0 hrs.	-1.36	-0.84	-0.07
20:15	4.0 hrs.	-1.29	-0.79	-0.07
21:15	5.0 hrs.	-1.25	-0.76	-0.06
22:15	6.0 hrs.	-1.25	-0.76	-0.07
Maximum Change:		-1.36	-0.84	-0.07

GROUNDWATER DRAWDOWN DATA

		Well Designation:		
		RW-01	RW-03	MW-05
Nearest Extraction Well:		RW-04	RW-05	RW-05
Approximate Distance:		32 feet	38 feet	52 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):		
Prior to EFR®		7.49	7.95	7.44
23:45	7.5 hrs.	8.63	8.93	8.17
Maximum Change:		-1.14	-0.98	-0.73

EFR® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 7
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 1/8/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	16:00	Inlet	MW-04	RW-04	RW-05	RW-06					Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
MW-04;	16:15	18	12	13	7	8					3,200	1,800	88	4.6	1.2
RW-04,05,06	16:30	18	12	13	7	8					2,400	1,800	88	3.5	0.9
"	16:45	18	13	13	7	8					2,000	1,800	88	2.9	0.7
"	17:00	17	13	13	7	8					1,500	1,800	88	2.2	0.5
"	17:30	17	13	13	7	8					1,000	1,800	88	1.4	0.7
"	18:00	17	12	13	7	8					840	1,800	88	1.2	0.6
"	19:00	17	12	13	7	8					840	1,800	88	1.2	1.2
"	20:00	17	12	13	7	8					860	1,800	88	1.2	1.2
"	21:00	17	12	13	7	8					660	1,800	88	0.9	0.9
"	22:00	17	12	13	7	8					600	1,800	88	0.9	0.9
"	23:00	17	11	13	7	8					580	1,800	88	0.8	0.8
"	0:00	17	11	13	7	8					560	1,800	88	0.8	0.8

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-01	2"	13.71							
MW-02	2"	14.23							
MW-03	2"	13.73							
MW-04	2"	13.2	3.58	3.72	0.14	-	7.46	0.00	-3.85
MW-05	2"	13.79	-	7.52	0.00	-	8.13	0.00	-0.61
MW-06	2"								
RW-01	4"	15.92	-	7.53	0.00	-	8.46	0.00	-0.93
RW-02	2"	14.44	-	7.73	0.00	-	8.30	0.00	-0.57
RW-03	2"		-	8.00	0.00	-	8.85	0.00	-0.85
RW-04	4"	15.41	7.44	7.45	0.01	-	10.88	0.00	-3.44
RW-05	4"	16.4	7.56	7.57	0.01	-	10.76	0.00	-3.20
RW-06	4"	10.31	5.05	5.11	0.06	-	9.68	0.00	-4.62

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	cracked	9 feet	Hydrocarbons Removed (vapor):	10	pounds
Truck Operator:	Jeans	RW-04	cracked	11 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	154	RW-05	cracked	11 feet	Total Hydrocarbons Removed:	1.6	equiv. gal.
Vacuum Pumps:	Becker	RW-06	0 (closed)	10 feet	Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	M27904	
Stack I.D. (inches)	3.0				Total Liquids Removed:	2,253	gallons

ECOVAC SERVICES ENVIRONMENTAL REMEDIATION	Time:	16:00 to 00:00
	# Pumps:	2
	RPMs:	900
	Time:	
www.ecovacservices.com	# Pumps:	
770-592-1001	RPMs:	

Differential Pressure and Groundwater Drawdown Data Recorded During EFR®

Event #: 7 Date: 1/8/14

Facility Name: Building 419

Facility Address: Fort Stewart, Hinesville, Georgia

DIFFERENTIAL PRESSURE DATA

		Well Designation:		
		RW-01	RW-03	MW-05
Nearest Extraction Well:		RW-04	RW-05	RW-05
Approximate Distance:		32 feet	38 feet	52 feet
Time	Elapsed Time	Differential Pressures (inches of water):		
17:00	1.0 hr.	-1.30	-0.84	-0.09
18:00	2.0 hrs.	-1.28	-0.82	-0.09
19:00	3.0 hrs.	-1.26	-0.82	-0.09
20:00	4.0 hrs.	-1.23	-0.81	-0.07
21:00	5.0 hrs.	-1.24	-0.83	-0.11
22:00	6.0 hrs.	-1.09	-0.80	-0.07
Maximum Change:		-1.30	-0.84	-0.11

GROUNDWATER DRAWDOWN DATA

		Well Designation:		
		RW-01	RW-03	MW-05
Nearest Extraction Well:		RW-04	RW-05	RW-05
Approximate Distance:		32 feet	38 feet	52 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):		
Prior to EFR®		7.53	8.00	7.52
23:30	7.5 hrs.	8.46	8.85	8.13
Maximum Change:		-0.93	-0.85	-0.61

CUMULATIVE EFR® DATA TABLE

Building 419

Fort Stewart, Georgia

	6/12/2011	7/17/2011	8/6/2011	12/9/2013	12/10/2013	1/7/2014	1/8/2014
SPH Thickness (ft.) MW-04	0.42	0.46	0.35	1.25	0.12	0.84	0.14
SPH Thickness (ft.) RW-01	0.25	0.05	0.00			0.00	0.00
SPH Thickness (ft.) RW-04	4.50	2.26	1.40	2.19	0.00	1.09	0.01
SPH Thickness (ft.) RW-05	3.79	2.59	1.05	1.56	1.13	0.57	0.01
SPH Thickness (ft.) RW-06	1.02	0.47	0.47	3.88	3.86	0.86	0.06
Liquid Removed/Event (Gal.)	2,573	2,578	2,494	1,019	909	2,417	2,253
Cumulative Liquid Removed (Gal.)	2,573	5,151	7,645	8,664	9,573	11,990	14,243
Pounds Removed/Event	96	187	316	167	94	42	11
Cumulative Pounds Removed	96	283	599	766	860	902	913
Equiv. Gal. Gasoline Removed/Event	14	26	48	25	14	6.4	1.6
Cumulative Equiv. Gal. Removed	14	40	88	113	128	134	136

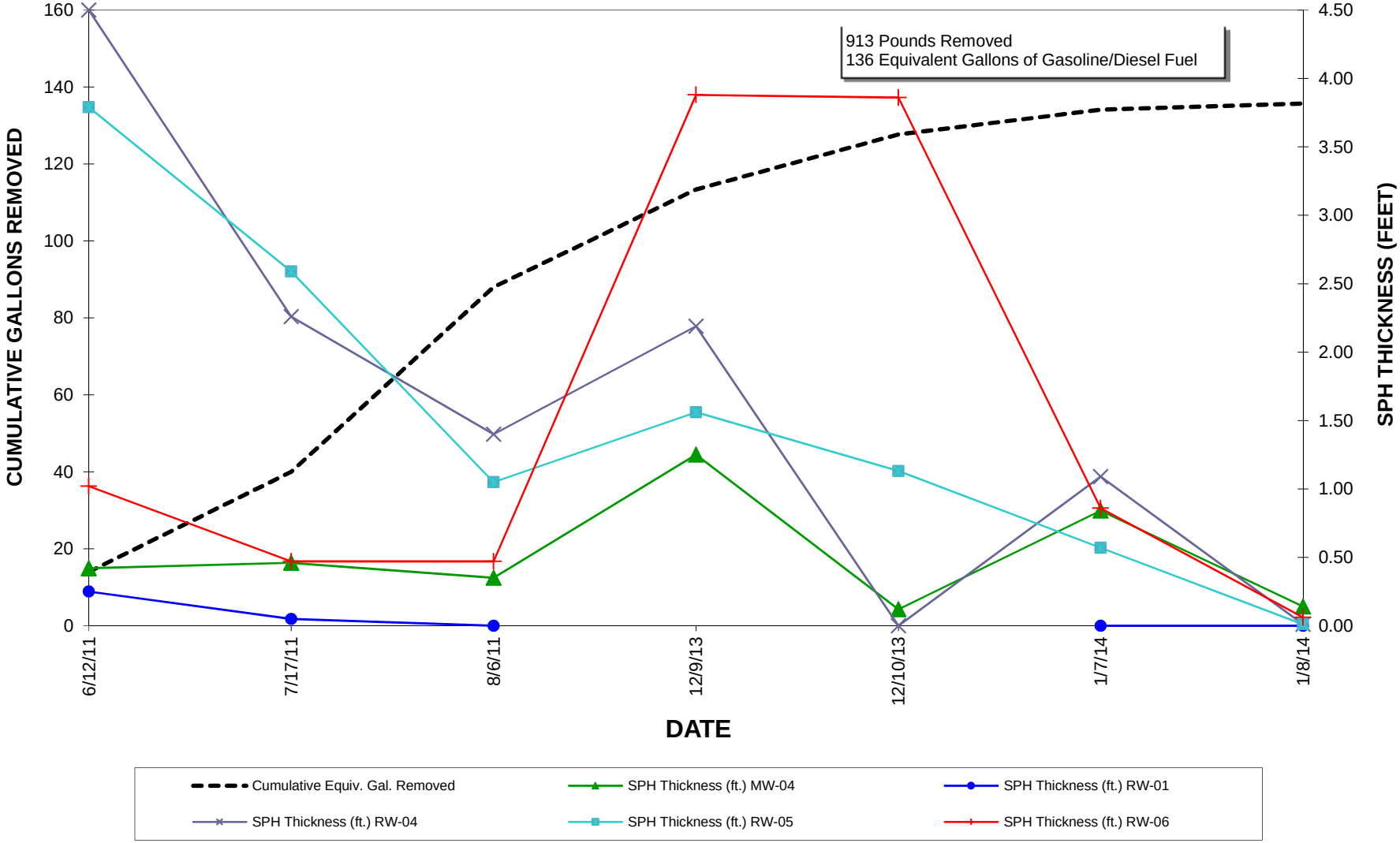
Not Gauged

Last Update: 1/23/2014

CUMULATIVE EFR® GRAPH

Building 419

Fort Stewart, Georgia



Last Update: 1/23/2014

Georgia Petroleum, Inc.

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

M- 27899

GENERATOR

3. Generator's Name and Mailing Address
ECO VAC SERVICES
105 WEATHERSTONE DR
WOODSTOCK, GA 30188
2934-001

4. Generator's Phone (770 592-1001

5. Transporter 1 Company Name
ECO VAC SERVICES

6. US EPA ID No.

A. Transporter's Phone
770-592-1001

7. Transporter 2 Company Name

8. US EPA ID No.

B. Transporter's Phone

9. Designated Facility Name and Site Address
Georgia Petroleum, Inc.
1620 James P. Rodgers Drive
Valdosta, Georgia 31601

10. US EPA ID No.
GAD# 981222433

C. Facility's Phone
229-244-9110

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. WASTE WATER, DOT & RCRA NON-REGULATED	1	TT	2,417	GAL
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

API _____ **VIS** _____ **BSW** _____

CHLOR _____

E. Handling Codes for Waste Listed Above

15. Special Handling Instructions and Additional Information

In the event of an emergency call 229-244-9110 Mon - Fri 8-5

GROSS 2417
BSW 0
NET 2417

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

TRANSPORTER

Printed/Typed Name: Alex Yarbrough — Signature: [signature] — Month 01 Day 08 Year 14

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Alex Yarbrough — Signature: [signature] — Month 01 Day 08 Year 14

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted on item 19.

Printed/Typed Name: Venus Martin — Signature: Venus Martin — Month 11 Day 8 Year 14

ORIGINAL RETURN TO GENERATOR

12-BLS-C6 Rev. 1/97

Georgia Petroleum, Inc.

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

M- 27904

3. Generator's Name and Mailing Address
ECO VAC SERVICES
105 WEATHERSTONE DR
WOODSTOCK, GA 30188

2934-001

4. Generator's Phone (770 592-1001

5. Transporter 1 Company Name
ECO VAC SERVICES

6. US EPA ID No.

A. Transporter's Phone
770-592-1001

7. Transporter 2 Company Name

8. US EPA ID No.

B. Transporter's Phone

9. Designated Facility Name and Site Address
Georgia Petroleum, Inc.
1620 James P. Rodgers Drive
Valdosta, Georgia 31601

10. US EPA ID No.
GAD# 981222433

C. Facility's Phone
229-244-9110

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. WASTE WATER, DOT & RCRA NON-REGULATED	1	TT	2,253	GAL
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

API _____ **VIS** _____ **BSW** _____

CHLOR _____

E. Handling Codes for Waste Listed Above

15. Special Handling Instructions and Additional Information

In the event of an emergency call 229-244-9110 Mon - Fri 8-5

GROSS 2253
BSW 0
NET 2253

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: Alex Yarbrough | Signature: [signature] | Month 01 Day 09 Year 14

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Alex Yarbrough | Signature: [signature] | Month 01 Day 09 Year 14

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted on item 19.

Printed/Typed Name: Venus Martin | Signature: Venus Martin | Month 1 Day 9 Year 14

GENERATOR → TRANSPORTER → FACILITY

ORIGINAL RETURN TO GENERATOR

12-BLS-C6 Rev. 1/97

ECOVAC SERVICES
The World Leader in Mobile Dual-Phase/Multi-Phase Extraction and
Patented SURFAC®/ISCO-EFR®/COSOLV® Technologies
Treatability Studies/Research & Development

February 26, 2014

Mr. Doug Hawn
SpecPro Environmental
1006 Floyd Culler Court
Oak Ridge, Tennessee 37830
dhawn@specproenv.com

Subject: **SURFAC® Results**
Event Nos. 8 - 14
Building 419
Fort Stewart, Georgia

Dear Mr. Hawn:

Please find attached the data summary for SURFAC® (surfactant injection combined with dual-phase/multi-phase extraction) events conducted on February 10 to 13 and February 16 to 18, 2014 (Events 8 - 14). Previous EFR® events were conducted at the subject site from June 12, 2011 to January 8, 2014. SURFAC® pilot tests were conducted at the subject site on December 9 and 10, 2013.

EcoVac Services' **patented** SURFAC® process is the combination of dual-phase/multi-phase extraction and surfactant injection. EcoVac Services employs its EFR® (Enhanced Fluid Recovery) process for the dual-phase/multi-phase extraction component of EcoVac Services' patented SURFAC® process. **The process described herein is patent-protected and represents the intellectual property of EcoVac Services.** The following summarizes the results of SURFAC® at this site.

SUMMARY OF RESULTS

SURFAC® – Event No. 8 (February 10, 2014)

Separate-phase hydrocarbons (SPH) were detected in four of the gauged wells (MW-04 – 0.95 foot, RW-04 – 2.45 feet, RW-05 – 0.74 foot, and RW-06 – 0.20 foot) prior to conducting this SURFAC® event. This event was conducted for approximately 6.25 hours at four extraction points, consisting of MW-04, RW-04, RW-05, and RW-06. SPH were not detected in any of the gauged wells upon completion of this injection event.

A calculated total of 66 pounds of petroleum hydrocarbons (approximately 10 equivalent gallons of petroleum hydrocarbons) was removed during this injection event. Hydrocarbon removal rates ranged from 2.4 to 40 pounds per hour with a trend of decreasing removal rates throughout this event.

105 Weatherstone Drive, Suite 610 - Woodstock, Georgia 30188
(770) 592-1001 - Fax (770) 592-1801
www.ecovacservices.com

Vapor concentrations ranged from 2,000 to 28,000 parts per million by volume (PPM_V) during this event. Vapor flow rates ranged from 74 to 88 cubic feet per minute (CFM). In-well vacuums recorded at the extraction wells during this SURFAC® event are detailed in the SURFAC® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
MW-04	10 inches of mercury
RW-04	11 to 15 inches of mercury
RW-05	1 inch of mercury
RW-06	11 inches of mercury

Approximately 1,588 gallons of liquid were removed during this event and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event.

SURFAC® – Event No. 9 (February 11, 2014)

No extraction took place during this SURFAC® injection event.

SURFAC® – Event No. 10 (February 12, 2014)

SPH were not detected in any of the gauged wells prior to, or upon completion of, conducting this SURFAC® event. This event was conducted for approximately 6.5 hours at two extraction points, consisting of RW-04 and RW-05.

A calculated total of 8.8 pounds of petroleum hydrocarbons (approximately 1.3 equivalent gallons of petroleum hydrocarbons) was removed during this event. Hydrocarbon removal rates ranged from 0.2 to 1.8 pounds per hour with a trend of increasing removal rates throughout this event.

Vapor concentrations ranged from 300 to 2,800 PPM_V during this event. Vapor flow rates ranged from 39 to 54 CFM. In-well vacuums recorded at the extraction wells during this SURFAC® event are detailed in the SURFAC® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
RW-04	20 to 23 inches of mercury
RW-05	19 inches of mercury

Approximately 345 gallons of liquid were removed during this event and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this injection event.

SURFAC® – Event No. 11 (February 13, 2014)

SPH were not detected in any of the gauged wells prior to, or upon completion of, conducting this SURFAC® event. This event was conducted for eight hours at four extraction points, consisting of MW-05, RW-04, RW-05, and RW-06.

A calculated total of 12 pounds of petroleum hydrocarbons (approximately 1.8 equivalent gallons of petroleum hydrocarbons) was removed during this event. Hydrocarbon removal rates ranged from 0.7 to 2.7 pounds per hour during this event.

Vapor concentrations ranged from 700 to 2,600 PPM_V during this capture event. Vapor flow rates ranged from 59 to 69 CFM. In-well vacuums recorded at the extraction wells during this SURFAC® event are detailed in the SURFAC® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
MW-04	14 to 15 inches of mercury
RW-04	15 to 17 inches of mercury
RW-05	18 to 20 inches of mercury
RW-06	3 to 5 inches of mercury

Approximately 1,407 gallons of liquid were removed during this event and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this capture event.

SURFAC® – Event No. 12 (February 16, 2014)

SPH were detected in two of the gauged wells (RW-04 – 0.02 feet and RW-05 – 0.02 feet) prior to conducting this SURFAC® event. This event was conducted for seven hours at four extraction points, consisting of MW-05, RW-04, RW-05, and RW-06. SPH were not detected in any of the gauged wells upon completion of this event.

A calculated total of 5.9 pounds of petroleum hydrocarbons (approximately 0.9 equivalent gallon of petroleum hydrocarbons) was removed during this event. Hydrocarbon removal rates ranged from 0.6 to 1.2 pounds per hour during this event.

Vapor concentrations ranged from 600 to 1,200 PPM_V during this event. Vapor flow rates ranged from 49 to 64 CFM. In-well vacuums recorded at the extraction wells during this SURFAC® event are detailed in the SURFAC® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
MW-04	15 inches of mercury
RW-04	10 inches of mercury
RW-05	15 inches of mercury
RW-06	15 to 16 inches of mercury

Approximately 1,330 gallons of liquid were removed during this event and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this capture event.

SURFAC® – Event No. 13 (February 17, 2014)

SPH were not detected in any of the gauged wells prior to, or upon completion of, conducting this SURFAC® event. This event was conducted for seven hours at four extraction points, consisting of MW-05, RW-04, RW-05, and RW-06.

A calculated total of 4.6 pounds of petroleum hydrocarbons (approximately 0.7 equivalent gallon of petroleum hydrocarbons) was removed during this event. Hydrocarbon removal rates ranged from 0.4 to 0.9 pound per hour during this event.

Vapor concentrations ranged from 400 to 800 PPM_V during this capture event. Vapor flow rates remained at 69 CFM. In-well vacuums recorded at the extraction wells during this SURFAC® event are detailed in the SURFAC® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
MW-04	14 inches of mercury
RW-04	11 inches of mercury
RW-05	15 inches of mercury
RW-06	15 to 16 inches of mercury

Approximately 949 gallons of liquid were removed during this event and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event.

SURFAC® – Event No. 14 (February 18, 2014)

SPH were not detected in any of the gauged wells prior to, or upon completion of, conducting this SURFAC® event. This event was conducted for eight hours at four extraction points, consisting of MW-05, RW-04, RW-05, and RW-06.

A calculated total of 3.4 pounds of petroleum hydrocarbons (approximately 0.5 equivalent gallon of petroleum hydrocarbons) was removed during this event. Hydrocarbon removal rates ranged from 0.4 to 0.6 pound per hour during this event.

Vapor concentrations ranged from 280 to 560 PPM_V during this event. Vapor flow rates ranged from 64 to 78 CFM. In-well vacuums recorded at the extraction wells during this SURFAC® event are detailed in the SURFAC® Field Data Sheet and summarized below:

Extraction Well	In-Well Vacuums
MW-04	6 inches of mercury
RW-04	12 inches of mercury
RW-05	13 inches of mercury
RW-06	3 inches of mercury

Approximately 1,005 gallons of liquid were removed during this event and transported to Georgia Petroleum (Valdosta, Georgia) for disposal. SPH was not detected in the vacuum truck tank upon conclusion of this event.

CONCLUSIONS:

A calculated total of 100.7 pounds of petroleum hydrocarbons (approximately 15.2 equivalent gallons of petroleum hydrocarbons) were recovered during these SURFAC® events. Approximately 2,776 gallons of a surfactant aqueous solution were injected into MW-04, RW-04, RW-05, and RW-06 throughout the course of the SURFAC® process. A total of 6,624 gallons of liquid were recovered and transported to Georgia Petroleum (Valdosta, Georgia) for disposal.

Thank you for the continued opportunity to team with SpecPro Environmental in serving the environmental needs of your clients. We look forward to working with you again in the future to provide innovative and cost effective environmental solutions at this and other sites.

Sincerely,

EcoVac Services

David M. Goodrich, P.G.

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 8
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 2/10/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
		Inlet	RW-04	MW-04	RW-05	RW-06					Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
Start Time:	16:00														
MW-04;RW-04,05,06	16:15	24	11	10	1	11					28,000	1,800	88	40	10.1
"	16:30	24	11	10	1	11					22,000	1,800	88	32	7.9
"	16:45	24	11	10	1	11					18,000	1,800	88	26	6.5
"	17:00	24	11	10	1	11					16,000	1,800	88	23	5.8
"	17:30	23	11	10	1	11					10,000	1,800	88	14	7.2
MW-04; RW-04,05	18:00	23	12	10	1	-					8,000	1,700	83	11	5.4
MW-04; RW-04	19:00	24	14	10	-	-					6,000	1,700	83	8.1	8.1
RW-04	20:00	25	14	-	-	-					6,000	1,600	78	7.7	7.7
"	21:00	25	15	-	-	-					4,000	1,500	74	4.8	4.8
"	22:00	25	15	-	-	-					2,000	1,500	74	2.4	2.4

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-01	2"	13.71	-	6.38	0.00				
MW-02	2"	14.23	-	6.86	0.00				
MW-03	2"	13.73	-	7.13	0.00				
MW-04	2"	13.2	3.75	4.70	0.95				
MW-05	2"	13.8	-	7.63	0.00				
MW-06	2"	13.0	-	8.01	0.00				
RW-01	4"	15.92	-	7.68	0.00				
RW-02	2"	14.4	-	7.96	0.00				
RW-03	2"		-	8.12	0.00				
RW-04	4"	15.4	7.47	9.92	2.45				
RW-05	4"	16.4	7.70	8.44	0.74				
RW-06	4"	10.3	8.12	8.32	0.20				

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	0 (closed)	10 feet	Hydrocarbons Removed (vapor):	66	pounds
Truck Operator:	Jeans	RW-04	0 (closed)	15 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	148	RW-05	0 (closed)	16 feet	Total Hydrocarbons Removed:	10	equiv. gal.
Vacuum Pumps:	Becker	RW-06	0 (closed)	10 feet	Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	M-27997	
Stack I.D. (inches)	3.0				Total Liquids Removed:	1,588	gallons

Time:	16:00 to 22:15	
# Pumps:	2	
RPMs:	900	
Time:		
# Pumps:		
RPMs:		

ECOVAC SERVICES ENVIRONMENTAL REMEDIATION

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770-592-1001

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 10
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 2/12/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	17:30	Inlet	RW-04	RW-05							Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
RW-04,05	17:45	25	20	19							300	800	39	0.2	0.0
"	18:00	25	20	19							300	800	39	0.2	0.0
"	18:15	25	20	19							480	1,100	54	0.4	0.1
"	18:30	25	22	19							600	1,100	54	0.5	0.1
"	19:00	25	22	19							1,000	1,100	54	0.9	0.4
"	19:30	25	23	19							1,800	800	39	1.2	0.6
"	20:30	25	23	19							2,200	800	39	1.4	1.4
"	21:30	25	23	19							2,600	800	39	1.7	1.7
"	22:30	25	23	19							2,600	800	39	1.7	1.7
"	23:30	25	23	19							2,800	800	39	1.8	1.8
"	0:00	25	23	19							2,800	800	39	1.8	0.9

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-04	2"	13.2	-	1.98	0.00	-	14.65	0.00	-12.67
RW-04	4"	15.4	-	6.96	0.00				
RW-05	4"	16.4	-	6.64	0.00	-	15.07	0.00	-8.43
RW-06	4"	10.3	-	4.06	0.00				

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth
Subcontractor:	AllVac	MW-04	<2	15 feet
Truck Operator:	Jeans	RW-05	<2	16 feet
Truck No.:	148			
Vacuum Pumps:	Becker			
Pump Type:	Twin LC-44s			
Tank Capacity (gal.):	2,894			
Stack I.D. (inches)	3.0			

Recovery/Disposal Information		
Hydrocarbons Removed (vapor):	8.8	pounds
Hydrocarbons Removed (liquid):	0	gallons
Total Hydrocarbons Removed:	1.3	equiv. gal.
Molecular Weight Utilized:	103	g/mole
Disposal Facility:	Georgia Petroleum	
Manifest Number:	M-28007	
Total Liquids Removed:	345	gallons

Time:	17:30 to 00:00
# Pumps:	2
RPMs:	900
Time:	
# Pumps:	
RPMs:	

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770-592-1001

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 11
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 2/13/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	16:00	Inlet	MW-04	RW-04	RW-05	RW-06					Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
MW-04;RW-04,05,06	16:15	24	14	16	18	3					2,000	1,400	69	2.2	0.6
"	16:30	25	15	17	20	4					1,800	1,400	69	2.0	0.5
"	16:45	25	15	17	20	5					2,400	1,300	64	2.5	0.6
"	17:00	25	15	17	20	5					2,600	1,300	64	2.7	0.7
"	17:30	25	15	17	20	5					2,600	1,300	64	2.7	1.4
"	18:00	25	15	17	20	5					2,400	1,300	64	2.5	1.2
"	19:00	25	15	15	20	5					2,200	1,300	64	2.3	2.3
"	20:00	25	15	15	20	5					1,400	1,300	64	1.5	1.5
"	21:00	25	15	17	20	5					1,100	1,200	59	1.1	1.1
"	22:00	25	15	17	20	5					800	1,300	64	0.8	0.8
"	23:00	25	15	17	20	5					800	1,200	59	0.8	0.8
"	0:00	25	15	17	20	5					700	1,200	59	0.7	0.7

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-01	2"	13.71	-	6.26	0.00				
MW-02	2"	14.23	-	6.75	0.00				
MW-03	2"	13.73	-	6.99	0.00				
MW-04	2"	13.2	-	1.88	0.00	-	10.82	0.00	-8.94
MW-05	2"	13.8	-	7.59	0.00	-	7.76	0.00	-0.17
MW-06	2"	13.0	-	7.98	0.00	-	8.11	0.00	-0.13
RW-01	4"	15.92	-	7.59	0.00	-	7.79	0.00	-0.20
RW-02	2"	14.4	-	7.84	0.00	-	7.97	0.00	-0.13
RW-03	2"		-	8.05	0.00	-	8.20	0.00	-0.15
RW-04	4"	15.4	-	7.53	0.00	-	Dry		
RW-05	4"	16.4	-	7.71	0.00	-	15.27	0.00	-7.56
RW-06	4"	10.3	-	2.95	0.00	-	9.60	0.00	-6.65

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	<2	10 feet	Hydrocarbons Removed (vapor):	12	pounds
Truck Operator:	Jeans	RW-04	<2	15 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	148	RW-05	<2	16 feet	Total Hydrocarbons Removed:	1.8	equiv. gal.
Vacuum Pumps:	Becker	RW-06	0 (closed)	10 feet	Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	M-28010	
Stack I.D. (inches)	3.0				Total Liquids Removed:	1,407	gallons

Time:	16:00 to 24:00	
# Pumps:	2	
RPMs:	900	
Time:		
# Pumps:		
RPMs:		

ECOVAC SERVICES ENVIRONMENTAL REMEDIATION

www.ecovacservices.com

770-592-1001

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 12
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 2/16/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	8:00	Inlet	MW-04	RW-04	RW-05	RW-06					Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
MW-04;RW-04,05,06	8:15	24	15	10	15	16					1,200	1,000	49	1.0	0.2
"	8:30	25	15	10	15	16					1,200	1,100	54	1.1	0.3
"	8:45	25	15	10	15	16					1,200	1,200	59	1.2	0.3
"	9:00	25	15	10	15	16					1,200	1,200	59	1.2	0.3
"	9:30	25	15	10	15	16					1,200	1,300	64	1.2	0.6
"	10:00	25	15	10	15	16					1,100	1,300	64	1.1	0.6
"	11:00	24	15	10	15	15					800	1,300	64	0.8	0.8
"	12:00	24	15	10	15	15					800	1,300	64	0.8	0.8
"	13:00	24	15	10	15	15					700	1,200	59	0.7	0.7
"	14:00	24	15	10	15	15					600	1,300	64	0.6	0.6
"	15:00	24	15	10	15	15					600	1,300	64	0.6	0.6

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-04	2"	13.2	-	2.60	0.00	-	10.85	0.00	-8.25
MW-05	2"	13.8	-	7.66	0.00	-	7.83	0.00	-0.17
MW-06	2"	13.0	-	8.03	0.00	-	8.16	0.00	-0.13
RW-01	4"	15.92	-	7.70	0.00	-	7.86	0.00	-0.16
RW-02	2"	14.4	-	7.95	0.00	-	8.06	0.00	-0.11
RW-03	2"		-	8.11	0.00	-	8.23	0.00	-0.12
RW-04	4"	15.4	7.65	7.67	0.02	-	Dry		
RW-05	4"	16.4	7.39	7.41	0.02	-	Dry		
RW-06	4"	10.3	-	5.26	0.00	-	9.79	0.00	-4.53

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	<2	10 feet	Hydrocarbons Removed (vapor):	5.9	pounds
Truck Operator:	Jeans	RW-04	<2	15 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	148	RW-05	<2	16 feet	Total Hydrocarbons Removed:	0.9	equiv. gal.
Vacuum Pumps:	Becker	RW-06	0 (closed)	10 feet	Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	M-28017	
Stack I.D. (inches)	3.0				Total Liquids Removed:	1,330	gallons

www.ecovacservices.com	Time:	8:00 to 15:00
770-592-1001	# Pumps:	2
	RPMs:	900
	Time:	
	# Pumps:	
	RPMs:	

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 13
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 2/17/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	12:30	Inlet	MW-04	RW-04	RW-05	RW-06					Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
MW-04;RW-04,05,06	12:45	24	14	11	15	15					800	1,400	69	0.9	0.2
"	13:00	25	14	11	15	15					800	1,400	69	0.9	0.2
"	13:15	25	14	11	15	15					800	1,400	69	0.9	0.2
"	13:30	25	14	11	15	15					700	1,400	69	0.8	0.2
"	14:00	25	14	11	15	16					700	1,400	69	0.8	0.4
"	14:30	25	14	11	15	16					700	1,400	69	0.8	0.4
"	15:30	24	14	11	15	16					700	1,400	69	0.8	0.8
"	16:30	24	14	11	15	16					640	1,400	69	0.7	0.7
"	17:30	24	14	11	15	16					520	1,400	69	0.6	0.6
"	18:30	24	14	11	15	16					400	1,400	69	0.4	0.4
"	19:30	24	14	11	15	16					400	1,400	69	0.4	0.4

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-04	2"	13.2	-	3.38	0.00	-	10.20	0.00	-6.82
MW-05	2"	13.8	-	7.64	0.00	-	7.79	0.00	-0.15
MW-06	2"	13.0	-	8.01	0.00	-	8.12	0.00	-0.11
RW-01	4"	15.92	-	7.71	0.00	-	7.84	0.00	-0.13
RW-02	2"	14.4	-	7.97	0.00	-	8.04	0.00	-0.07
RW-03	2"		-	8.12	0.00	-	8.21	0.00	-0.09
RW-04	4"	15.4	-	7.70	0.00	-	Dry		
RW-05	4"	16.4	-	7.89	0.00	-	Dry		
RW-06	4"	10.3	-	5.37	0.00	-	9.56	0.00	-4.19

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	0 (closed)	10 feet	Hydrocarbons Removed (vapor):	4.6	pounds
Truck Operator:	Jeans	RW-04	0 (closed)	15 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	148	RW-05	0 (closed)	16 feet	Total Hydrocarbons Removed:	0.7	equiv. gal.
Vacuum Pumps:	Becker	RW-06	0 (closed)	10 feet	Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	M-28024	
Stack I.D. (inches)	3.0				Total Liquids Removed:	949	gallons

Time:	12:30 to 19:30	
# Pumps:	2	
RPMs:	900	
Time:		
# Pumps:		
RPMs:		

ECOVAC SERVICES ENVIRONMENTAL REMEDIATION

www.ecovacservices.com

770-592-1001

SURFAC® FIELD DATA SHEET

Client: SpecPro	Facility Name: Building 419	Event #: 14
Facility Address: Fort Stewart, Hinesville, Georgia	Technician: Jeans	Date: 2/18/14

Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)									Vacuum Truck Exhaust				
Start Time:	8:00	Inlet	MW-04	RW-04	RW-05	RW-06					Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
MW-04;RW-04,05,06	8:15	23	6	12	13	3					560	1,300	64	0.6	0.1
"	8:30	23	6	12	13	3					540	1,400	69	0.6	0.2
"	8:45	24	6	12	13	3					500	1,400	69	0.6	0.1
"	9:00	24	6	12	13	3					440	1,400	69	0.5	0.1
"	9:30	24	6	12	13	3					380	1,400	69	0.4	0.2
"	10:00	24	6	12	13	3					320	1,400	69	0.4	0.2
"	11:00	23	6	12	13	3					300	1,500	74	0.4	0.4
"	12:00	22	6	12	13	3					300	1,500	74	0.4	0.4
"	13:00	22	6	12	13	3					280	1,600	78	0.4	0.4
"	14:00	22	6	12	13	3					400	1,600	78	0.5	0.5
"	15:00	22	6	12	13	3					340	1,600	78	0.4	0.4
"	16:00	22	6	12	13	3					340	1,600	78	0.4	0.4

Well Gauging Data:			Before EFR® Event			After EFR® Event			Corr. DTW
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)	Change (ft)
MW-04	2"	13.2	-	3.73	0.00	-	10.13	0.00	-6.40
MW-05	2"	13.8	-	7.66	0.00	-	7.77	0.00	-0.11
MW-06	2"	13.0	-	8.02	0.00	-	8.11	0.00	-0.09
RW-01	4"	15.92	-	7.74	0.00	-	7.82	0.00	-0.08
RW-02	2"	14.4	-	7.94	0.00	-	8.04	0.00	-0.10
RW-03	2"		-	8.11	0.00	-	8.20	0.00	-0.09
RW-04	4"	15.4	-	7.70	0.00	-	Dry		
RW-05	4"	16.4	-	7.91	0.00	-	Dry		
RW-06	4"	10.3	-	5.43	0.00	-	9.68	0.00	-4.25

Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	**Recovery/Disposal Information**		
Subcontractor:	AllVac	MW-04	0 (closed)	10 feet	Hydrocarbons Removed (vapor):	3.4	pounds
Truck Operator:	Jeans	RW-04	0 (closed)	15 feet	Hydrocarbons Removed (liquid):	0	gallons
Truck No.:	148	RW-05	0 (closed)	16 feet	Total Hydrocarbons Removed:	0.5	equiv. gal.
Vacuum Pumps:	Becker	RW-06	0 (closed)	10 feet	Molecular Weight Utilized:	103	g/mole
Pump Type:	Twin LC-44s				Disposal Facility:	Georgia Petroleum	
Tank Capacity (gal.):	2,894				Manifest Number:	M-28024	
Stack I.D. (inches)	3.0				Total Liquids Removed:	1,005	gallons

Time:	8:00 to 16:00	
# Pumps:	2	
RPMs:	900	
Time:		
# Pumps:		
RPMs:		

ECOVAC SERVICES ENVIRONMENTAL REMEDIATION

www.ecovacservices.com

770-592-1001

Georgia Petroleum, Inc.

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

M- 27997

3. Generator's Name and Mailing Address
ECO VAC SERVICES
105 WEATHERSTONE DR
WOODSTOCK, GA 30188
2934-001

4. Generator's Phone (770) 592-1001

5. Transporter 1 Company Name
ALL VAC SERVICES

6. US EPA ID No.
GAR000026591

A. Transporter's Phone

7. Transporter 2 Company Name

8. US EPA ID No.

B. Transporter's Phone

9. Designated Facility Name and Site Address
Georgia Petroleum, Inc.
1620 James P. Rodgers Drive
Valdosta, Georgia 31601

10. US EPA ID No.
GAD# 981222433

C. Facility's Phone
229-244-9110

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. WASTE WATER, DOT & RCRA NON-REGULATED	1	TT	1,588	GAL
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

API _____ **VIS** _____ **BSW** _____

CHLOR _____

E. Handling Codes for Waste Listed Above

15. Special Handling Instructions and Additional Information

In the event of an emergency call 229-244-9110 Mon - Fri 8-5

GROSS 1588
BSW 0
NET 1588

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
Michael Galloway	[signature]	2	11	14

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Michael Galloway	[signature]	2	11	14

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted on item 19.

Printed/Typed Name	Signature	Month	Day	Year
Venus Martin	Venus Martin	2	11	14

GENERATOR — TRANSPORTER — FACILITY

ORIGINAL RETURN TO GENERATOR

12-BLS-06 Rev. 1/97

Georgia Petroleum, Inc.

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

M- 28007

GENERATOR

3. Generator's Name and Mailing Address
ECO VAC SERVICES
105 WEATHERSTONE DR
WOODSTOCK, GA 30188

2934-001

4. Generator's Phone (770) 592-1001

5. Transporter 1 Company Name
ALL VAC SERVICES

6. US EPA ID No.
GAR000026591

A. Transporter's Phone

7. Transporter 2 Company Name

8. US EPA ID No.

B. Transporter's Phone

9. Designated Facility Name and Site Address
Georgia Petroleum, Inc.
1620 James P. Rodgers Drive
Valdosta, Georgia 31601

10. US EPA ID No.
GAD# 981222433

C. Facility's Phone
229-244-9110

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. WASTE WATER, DOT & RCRA NON-REGULATED	1	TT	345	GAL
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

API _____ **VIS** _____ **BSW** _____

CHLOR _____

E. Handling Codes for Waste Listed Above

15. Special Handling Instructions and Additional Information

In the event of an emergency call 229-244-9110 Mon - Fri 8-5

GROSS 345
BSW 0
NET 345

TRANSPORTER

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: Michael Galloway
Signature: M. [illegible]
Month 2 Day 13 Year 14

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Michael Galloway
Signature: M. [illegible]
Month 2 Day 13 Year 14

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month . Day . Year .

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted on item 19.

Printed/Typed Name: Venus Martin
Signature: Venus Martin
Month 2 Day 13 Year 14

ORIGINAL RETURN TO GENERATOR

12-BLS-C8 Rev. 1/97

Georgia Petroleum, Inc.

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

M- 28010

GENERATOR

3. Generator's Name and Mailing Address
ECO VAC SERVICES
105 WEATHERSTONE DR
WOODSTOCK, GA 30188
2934-001

4. Generator's Phone (770) 592-1001

5. Transporter 1 Company Name
ALL VAC SERVICES

6. US EPA ID No.
GAR000026591

A. Transporter's Phone

7. Transporter 2 Company Name

8. US EPA ID No.

B. Transporter's Phone

9. Designated Facility Name and Site Address
Georgia Petroleum, Inc.
1620 James P. Rodgers Drive
Valdosta, Georgia 31601

10. US EPA ID No.
GAD# 981222433

C. Facility's Phone
229-244-9110

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. WASTE WATER, DOT & RCRA NON-REGULATED	1	TT	1,407	GAL
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

API _____ **VIS** _____ **BSW** _____

CHLOR _____

E. Handling Codes for Waste Listed Above

15. Special Handling Instructions and Additional Information

In the event of an emergency call 229-244-9110 Mon - Fri 8-5

GROSS 1407
BSW 0
NET 1407

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

TRANSPORTER

Printed/Typed Name	Signature	Month	Day	Year
Michael Galloway	M. Galloway	2	14	14

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
M. Galloway	M. Galloway	2	14	14

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted on item 19.

Printed/Typed Name	Signature	Month	Day	Year
Venus Martin	Venus Martin	2	14	14

ORIGINAL RETURN TO GENERATOR

12-BLS-C6 Rev. 1/97

Georgia Petroleum, Inc.

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

M- 28017

GENERATOR

3. Generator's Name and Mailing Address
ECO VAC SERVICES
105 WEATHERSTONE DR
WOODSTOCK, GA 30188
2934-001

4. Generator's Phone (770) 592-1001

5. Transporter 1 Company Name
ALL VAC SERVICES

6. US EPA ID No.
GAR000026591

A. Transporter's Phone

7. Transporter 2 Company Name

8. US EPA ID No.

B. Transporter's Phone

9. Designated Facility Name and Site Address
Georgia Petroleum, Inc.
1620 James P. Rodgers Drive
Valdosta, Georgia 31601

10. US EPA ID No.
GAD# 981222433

C. Facility's Phone
229-244-9110

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. WASTE WATER, DOT & RCRA NON-REGULATED	1	TT	1,330	GAL
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

API _____ **VIS** _____ **BSW** _____

CHLOR _____

E. Handling Codes for Waste Listed Above

15. Special Handling Instructions and Additional Information

In the event of an emergency call 229-244-9110 Mon - Fri 8-5

GROSS 1330
BSW 0
NET 1330

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: Michael Galloway Jr
Signature:
Month 2 Day 17 Year 14

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Michael Galloway
Signature:
Month 2 Day 17 Year 14

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month . Day . Year .

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted on item 19.

Printed/Typed Name: Venus Martin
Signature: Venus Martin
Month 2 Day 17 Year 14

ORIGINAL RETURN TO GENERATOR

12-BLS-C6 Rev. 1/97

Georgia Petroleum, Inc.

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1	M- 28024

GENERATOR

3. Generator's Name and Mailing Address
ECO VAC SERVICES
105 WEATHERSTONE DR
WOODSTOCK, GA 30188
2934-001

4. Generator's Phone (770) 592-1001

5. Transporter 1 Company Name	6. US EPA ID No.	A. Transporter's Phone
ALL VAC SERVICES	GAR000026591	
7. Transporter 2 Company Name	8. US EPA ID No.	B. Transporter's Phone
9. Designated Facility Name and Site Address	10. US EPA ID No.	C. Facility's Phone
Georgia Petroleum, Inc. **1620 James P. Rodgers Drive** **Valdosta, Georgia 31601**	**GAD# 981222433**	**229-244-9110**

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. WASTE WATER, DOT & RCRA NON-REGULATED	1	TT	1,954	GAL
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

API _____ **VIS** _____ **BSW** _____

CHLOR _____

E. Handling Codes for Waste Listed Above

15. Special Handling Instructions and Additional Information

In the event of an emergency call 229-244-9110 Mon - Fri 8-5

GROSS 1954
BSW 0
NET 1954

TRANSPORTER

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
Michael Galloway	M. [illegible]	2	19	14

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Michael Galloway	M. [illegible]	2	19	14

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted on item 19.

Printed/Typed Name	Signature	Month	Day	Year
Venus Martin	Venus Martin	2	19	14

ORIGINAL RETURN TO GENERATOR

12-BLS-C6 Rev. 1/97

Appendix IV

Site Ranking Form

SITE RANKING FORM

Facility Name: Building 419 **Ranked by: J. Williams**
County: Liberty **Facility ID #: NA** **Date Ranked: June 3, 2014**

SOIL CONTAMINATION

A. Total Regulated PAHs
Maximum concentration at the site
(Assume <0.660 mg/kg if only gasoline was stored on site)

_____	≤ 0.0660	=	0
_____	0.066-0.99 mg/kg	=	10
X*	1-10 mg/kg	=	25
_____	> 10 mg/kg	=	50

* Pyrene 5.850 mg/kg, Sample SB-14-01 March 2011

B. Total Benzene –
Maximum Concentration found on site

_____	≤ 0.005 mg/kg	=	0
_____	> 0.005 - 0.05 mg/kg	=	1
X*	0.05 – 0.99 mg/kg	=	10
_____	1 – 9.9 mg/kg	=	25
_____	10 – 49.9 mg/kg	=	40
_____	≥ 50 mg/kg	=	50

* Sample SB-10-01 March 2011

C. Depth to Groundwater
(bls = below land surface)

_____	> 50' bls	=	1
_____	> 25' bls	=	2
_____	> 10' bls	=	5
X	≤ 25' bls	=	10

Fill in the blanks: (A. 25 + B. 10) = (35) x (C. 10) = (D. 350)

GROUNDWATER CONTAMINATION

E. Free product (non-aqueous-phase liquid hydrocarbons; See guidelines for definition of "sheen").

_____	No free product	=	0
_____	Sheen – 1/8"	=	250
_____	> 1/8" - 6"	=	500
_____	> 6" – 1 ft.	=	1,000

X For every additional inch, add another 100 points = **1,000 + (5.04 x 100) = 1,504**
Recovery Well RW-04, May 7, 2014 reported 1.42 feet or 17.04 inches.

F. Dissolved Benzene –
Maximum concentration at the site
(One well must be located at the source of the release.

X	≤ 5 μg/L	=	0
_____	> 5-100 μg/L	=	5
_____	> 100-1,000 μg/L	=	50
_____	> 1,000 – 5,000 μg/L	=	250

Fill in the blanks: (E. 1,504) + (F. 0) = (G. 1,504)

Facility Name: Building 419, Fort Stewart **County: Liberty Facility ID #: NA**

POTENTIAL RECEPTORS

Distance from nearest contaminant plume boundary to the nearest hydraulically connected point of withdrawal for water supply. This distance must be field-verified. **If the point of withdrawal is not hydraulically connected, evidence as outlined in the CAP-A guidance document MUST be presented to substantiate this claim.**

H. Public

_____	Impacted	=	2,000
_____	≤ 500'	=	500
_____	> 500' – ¼ mi	=	25
X*	> ¼ mi – 1 mi	=	10
_____	> 1 mi – 2 mi	=	2
_____	> 2 mi	=	0

For lower susceptibility areas only:
_____ > 1 mi = 0
.* Nearest Public water supply 1,800 ft.

I. Nonpublic

_____	Impacted	=	1, 000
_____	≤ 100'	=	500
_____	> 100' – 500'	=	25
_____	> 500' – ¼ mi	=	5
X*	> ¼ mi – ½ mi	=	2
_____	> ½ mi	=	0

For lower susceptibility areas only:
_____ > ¼ mi = 0
* Nearest nonpublic water supply = 2,000 ft.

J. Distance from the nearest contaminant plume boundary to down gradient surface waters **OR UTILITY TRENCHES & VAULTS** (Must be field verified)

_____	Impacted	=	500
X*	≤ 500'	=	50
_____	> 500' – 1,000'	=	5
_____	> 1,000'	=	2

* nearest downgradient surface water = 50 ft.

K. Distance from any Free Product to basements and crawl spaces

_____	Impacted	=	500
_____	≤ 500'	=	50
_____	> 500' – 1,000'	=	5
X	> 1,000'	=	2

Fill in the blanks: (H. 10) + (I. 2) + (J. 50) + (K. 2) = L. 64

(G. 1,504) x (L. 64) = M. 96,256

(M. 96,256) + (D. 350) = N. 96,606

P. SUSCEPTIBILITY AREA MULITIPLIER

_____ If site is located in a Low Ground – Water Pollution Susceptibility Area = 0.5

X All other sites = 1

Q. EXPLOSION HAZARD

Have any explosive petroleum vapors, possibly originating from this release, been detected in any subsurface structure (e.g., utility trenches, basements, vaults, crawl spaces, etc.)?

_____ Yes = 200,000

X No = 0

Fill in the blanks: (**N. 96,606 x (P. 1) = (96,606) + (Q. 0)**

Environmental Sensitivity Score = 96,606

ENVIRONMENTAL SENSITIVITY SCORE

OTHER GEOLOGIC AND HYDROGEOLOGIC DATA

The following information is presented to provide supplemental information to Item H of the Site Ranking Form; it provides detailed information relating to the geologic and hydrogeologic conditions at Fort Stewart, which supports Fort Stewart's determination that the water withdrawal point(s) at Fort Stewart are not hydraulically connected to the surficial aquifer.

1.0 REGIONAL AND LOCAL GEOLOGY

Fort Stewart is within the coastal plain physiographic province. This province is typified by nine southeastward dipping strata that increase in thickness from 0 feet at the fall line, approximately 150 miles inland from the Atlantic coast, to approximately 4,200 feet at the coast. State geologic records describe a probably petroleum exploration well (the No. 1 Jelks-Rogers) in the region as encountering crystalline basement rocks at a depth of 4,254 feet below ground surface (BGS). This well provides the most complete record for Cretaceous, Tertiary, and Quaternary sedimentary strata in the region.

The Cretaceous section was found to be approximately 1,970 feet thick and dominated by clastics. The Tertiary section was found to be approximately 2,170 feet thick and dominated by limestone with a 175-foot cap of dark green phosphatic clay. This clay is regionally extensive and is known as the Hawthorn Group. The interval from approximately 110 feet to the surface is Quaternary in age and composed primarily of sand with interbeds of clay or silt. This section is undifferentiated into separate formations (Herrick and Vochis 1963).

State geologic records contain information regarding a well drilled in October 1942, 1.8 miles north of Flemington at Liberty Field of Camp Stewart (now known as Fort Stewart). This well is believed to be an artesian well approximately ¼ mile north of the runway at Wright Army Airfield within the Fort Stewart Military Reservation. The log for this well describes a 410-foot section, the lowermost 110 feet of which consisted predominantly of limestone sediments, above which 245 feet of dark green phosphatic clay typical of the Hawthorn Group was encountered. The uppermost portion of the section was found to be Quaternary-age interbedded sands and clays. The top 15 feet of these sediments was described as sandy clay (Herrick and Vochis 1963).

The surface soil in the Fort Stewart garrison area consists of Stilson loamy sand. The surface layer of this soil is typically dark grayish-brown loamy sand measuring approximately 6 inches in depth. The surface layer is underlain by material consisting of pale yellow loamy sand and extends to a depth of approximately 29 inches. The subsoil is dominantly sandy clay loam and extends to a depth of 72 inches or more (Herrick and Vochis 1963).

2.0 REGIONAL AND LOCAL HYDROGEOLOGY

The hydrogeology in the vicinity of Fort Stewart is dominated by two aquifers referred to as the Principal Artesian and the Surficial aquifers. The Principal Artesian Aquifer is the lowermost hydrologic unit and extends from South Carolina through Georgia, Alabama, and most of Florida. Known elsewhere as the Floridan, this aquifer is composed primarily of Tertiary-age limestone, including the Bug Island Formation, the Ocala Group, and the Suwannee Limestone. These formations are approximately 800 feet thick, and groundwater from this aquifer is used primarily for drinking water (Arora 1984).

The uppermost hydrologic unit is the surficial aquifer, which consists of sand and clay ranging from 55 to 150 feet in thickness. This aquifer is primarily used for domestic lawn and agricultural irrigation. The top of the water table ranges approximately 2 feet to 10 feet BGS (Geraghty and Miller 1993). The base of the aquifer corresponds to the top of the underlying dense clay of the Hawthorn Group. The Hawthorn Group was not encountered during drilling at this site but is believed to be 40 feet to 50 feet BGS; thus, the effective aquifer thickness would be approximately 35 feet to 45 feet. Soil surveys for Liberty and Long counties describe the occurrence of a perched water table within the Stilson loamy sands present within Fort Stewart (Looper 1980).

The confining layer for the Principal Artesian aquifer is the phosphatic clay of the Hawthorn Group and ranges in thickness from 15 feet to 90 feet. The vertical hydraulic conductivity of this confining unit is on the order of 10^{-8} cm/sec. There are minor occurrences of aquifer material within the Hawthorn Group; however, they have limited utilization (Miller 1990). The Hawthorn Group has been divided into three formations; Coosawhatchie Formation, Markshead Formation, and the Parachula Formation, which are listed from youngest to oldest.

The Coosawhatchie Formation is composed predominately of clay but also has sandy clay, argillaceous sand, and phosphorite units. The formation is approximately 170 feet thick in the Savannah, Georgia, area. This unit disconformably overlies the Markshead Formation and is distinguished from the underlying unit by dark phosphatic clays or phosphorite in the lower part and fine-grained sand in the upper part.

The Markshead Formation is approximately 70 feet thick in the Savannah, Georgia, area and consists of light-colored phosphatic, slightly dolomitic, argillaceous sand to fine-grained sandy clay with scattered beds of dolostone and limestone.

The Parachula Formation consists of sand, clay, limestone, and dolomite, and is approximately 10 feet thick in the Savannah, Georgia, area. The Parachula Formation generally overlies the Suwannee Limestone in Georgia.

Groundwater encountered at all the underground storage tank (UST) investigation sites is part of the Surficial Aquifer system. Based on the fact that all public and nonpublic water supply wells draw water from the Principal (Floridan) Aquifer, and that the Hawthorn confining unit separates the Principal Aquifer from the Surficial Aquifer, it is concluded that there is no hydraulic interconnection between the Surficial Aquifer (and associated groundwater plumes, if applicable) located beneath former UST sites and identified water supply withdrawal points at Fort Stewart.

3.0 REFERENCES

Arora, Ram, 1984, *Hydrologic Evaluation for Underground Injection Control in the Coastal Plain of Georgia,* Department of Natural Resources, Environmental Protection Division, Georgia Geological Survey.

Geraghty and Miller, 1993. *RCRA Facility Investigation Work Plan, Fort Stewart, Georgia.*

Herrick, S. M., and R. C. Vochis 1963. *Subsurface Geology of the Georgia Coastal Plain,* Georgia. Geologic Survey Information Circular 25.

Looper, Edward E., 1980. *Soil Survey of Liberty and Long Counties, Georgia,* U.S. Department of Agriculture, Soil Conservation Service.

Miller, James A., 1990. *Groundwater Atlas of the United States,* U.S. Department of the Interior, U.S. Geological Survey, Hydrologic Inventory Atlas 730G.